

FLIGHT

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The Imperial Fleet

IMPERIAL AIRWAYS may be heartily congratulated on the report just issued, in which a net profit of £133,769 is shown, as against £78,571 for the previous year. Air transport as an industry has certainly come into its own. Subsidies are still, unfortunately, necessary, but, as we remarked last week, it is a very hopeful sign that it is now possible to run additional services without the help of a subsidy.

These duplicated services taxed the capacities of the aircraft fleet of the company, which now consists of forty-two machines, of which five D.H.86 (or Diana-class) aeroplanes are still under construction. When considering the provision for the Empire services, one should add to this fleet the five Dianas belonging to Qantas Empire Airways. Of the fleet actually owned by Imperial Airways, the following can be described as first-line aircraft for service on the Empire routes: eight H.P.42 machines (Heracles and Hannibal types), three Scipio flying boats, six Atalantas, two Short Scyllas, and five completed Dianas. Of these twenty-four machines three have been put out of action in the last fortnight, namely, the H.P. *Hanno*, the Short *Syrinx*, and the D.H. *Draco*, while of the feeder-service machines the Boulton Paul *Britomart* has also been unfortunate. This is a heavy misfortune, when regular services have to be run to Capetown and Singapore. The organisation of the company will be hard put to it to keep all the services in full operation, especially in the winter, when the cloudless skies of the East and the South are especially attractive to travellers. No doubt the resourcefulness of the company will remain undefeated, and the difficulties will be overcome.

When Imperial Airways in 1928 decided to order eight forty-two-seaters from the Handley Page firm to replace the existing Argosies and Hercules', some people were

inclined to marvel at the boldness of that stride forward, and to think that Imperial Airways might have overreached themselves. Now it appears that that order, and the subsequent orders for Atalantas and Dianas, erred on the side of caution. Not enough provision was allowed for reserves in the case of mishaps. Certainly mishaps to Imperial Airways machines are not of common occurrence, and passengers ordinarily board their aeroplanes with the same confidence of arriving punctually at their destinations, be they bound for Capetown or Singapore, as they would feel when taking a railway ticket from London to Brighton. But even railways sometimes meet with mishaps, and airways companies are not yet entirely immune. Reserve machines are necessary. Probably in 1928 economy had to be considered rather more carefully than is now necessary, and it seemed wiser to risk a shortage of fleet than to risk spending more money. The position is now different.

Provision for the Future

When the five Dianas now under construction—Dardanus, Dido, Danae (the company's report prints the last two letters as a diphthong, but that is wrong. The name has three syllables), Dione, and Dryad—are completed, Imperial Airways will be in a much stronger position. For the future, however, ample provision is being made. The company has on order or under construction twenty-nine flying boats and twelve landplanes. These, presumably, will all be of the new class which is to be put into operation in 1937, machines of long range and high speed. The flying boat is, as pointed out in *Flight*, to be the standard class for Empire services. It will take quite a number of them to provide four or five deliveries a week to Karachi, in addition to all the other improvements foreshadowed. Plans are also in hand for a service across the Atlantic, beginning with the section between Bermuda and New York. Pan-American Airways will co-operate in this, and so the call

on the resources of Imperial Airways will not be too heavy.

Twenty-nine seaplanes and twelve landplanes is certainly a very large order. Seven years ago it would have seemed fantastic. It is very much to be welcomed as showing that Imperial Airways are now looking forward to really large developments, and are taking timely measures to ensure a fleet which will be able to maintain their schedules.

South Africa Expands

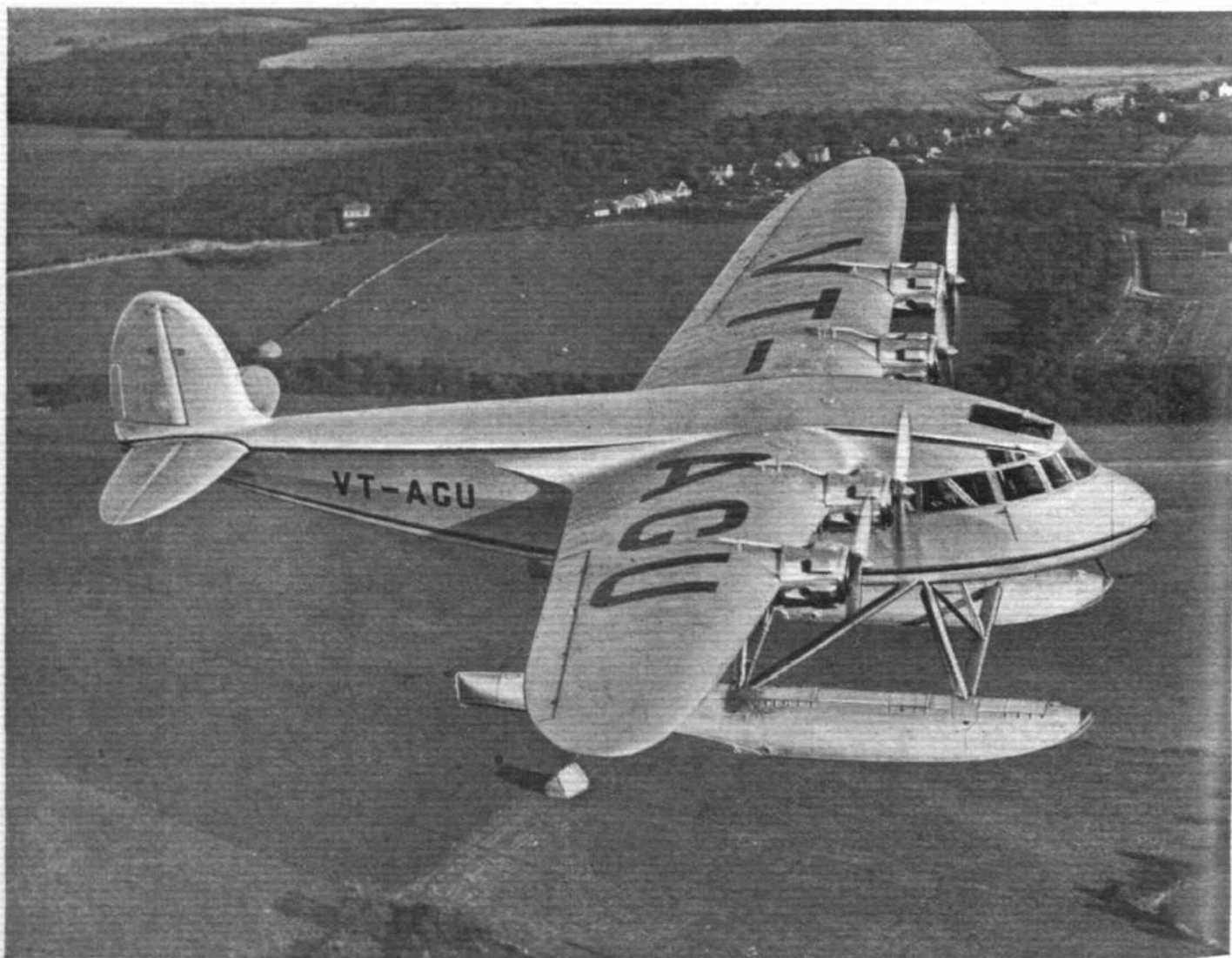
FOR British Dominions which cannot spend vast sums on defence, and which, thanks to the Royal Navy, do not need to spend vast sums, the best value for money is an efficient Air Force. None of the Dominions is in any real danger of invasion by land, and not one of them could afford a Navy strong enough to ensure by its own efforts the security of the country's coasts. The obvious conclusion is to put every penny which can be found for defence into a thoroughly efficient Air Force, which could at least make an attack from the sea a very hazardous proceeding.

The Union of South Africa has evidently grasped the truth of this principle, and is engaged on a five-years'

plan for the expansion of its Air Force. The Minister of Defence has announced a scheme for maintaining three squadrons, one a bombing squadron, one for general purposes, and one training squadron. This seems a modest scheme, devised chiefly with an eye on internal tranquillity. With its large African population, the Union must always be prepared to take immediate steps to deal with local outbreaks, and the mobility of an Air Force and its almost complete immunity from damage by non-civilised insurgents, makes it the ideal weapon for dealing with such troubles.

According to a message from the Johannesburg correspondent of the *Daily Telegraph*, this scheme has evidently been expanded, and the present programme visualises 250 new machines, 1,000 pilots, and 3,000 air-men, inclusive of both permanent forces and reserves. That will make a very considerable force, which will not only be ample for dealing with internal troubles, but would have to be given serious consideration by any foe who was contemplating naval action against the coast.

The basis of this Air Force will be the Hawker Hart Bee, a name which by a natural and inevitable development has become the Hartbeest. It is a form of the Hart with Kestrel engine, adapted for general purposes in South African conditions. Most of the machines will be built under licence at Pretoria.



SHORT BROTHERS' LATEST : The Scion Senior, described in detail in the following pages, carries up to ten passengers at a maximum speed of 134 m.p.h. although its four Pobjoy Niagara engines develop a total of only 360 b.h.p. The next machine to be built will have a wheel undercarriage. (*Flight* photograph).

The Outlook

A Running Commentary on Air Topics

A Question of Name

ALTHOUGH *Flight* has always used the original words *Pou-du-Ciel* when referring to M. Mignet's design of ultra-light aeroplane, the general public has probably become more accustomed to the bowdlerised translation, "Flying Flea."

Judging from a notice printed in a recent issue of the *Trade Marks Journal* it appears that a certain firm has applied for a registration of the words "Flying Flea" as a trade mark. If the request is granted it will be impossible for any other concern to use this name when referring to complete machines or to parts, and interested people should know that opposition to this registration must be lodged at the Trade Marks Office before November 23.

Certainly the word *Pou*, though familiar enough to people actively connected with the flying business, would convey little or nothing to the thousands of ordinary persons who have interested themselves in this machine, and the words "Sky Louse" might offend the more susceptible!

Unlimited Live Stock

WE have always thought that an aerodrome with an unlimited licence should automatically be guaranteed to be in a fit state at all times. Have, for example, the owners of such an aerodrome the right to leave cattle unguarded thereon during the week-end?

After all, the pilot of a big machine on an internal service might, with the still limited radio services available in this country, see fit to make for such an aerodrome if the weather closed in on him. He would be unable to give the owners of the aerodrome any notice of his impending arrival, but he would probably be surprised and worried to find the whole place littered with live stock.

One feels that the Air Ministry ought to prohibit grazing on aerodromes with unlimited licences, or at least to stipulate that a fairway should always be kept free in case of emergency. Only last summer, while flying in heavy rain, a member of the staff of *Flight* found himself unable to use a near-by aerodrome owing to the fact that sheep were scattered over it. This aerodrome had a limited licence only, but the circumstances are typical.

Getting Away With It

FIGURES, it is often said, can be made to prove anything. In aviation this is no less true than in any other walk of life. It all depends on how one interprets the figures. By a coincidence we happen to publish in this week's issue descriptions of several types of aircraft which differ a good deal in their characteristics; so much so that the question arises: Who is right?

The military version of the Vultee V-1A (see pages 462-463) has, as a bomber, a tare weight of 5,200 lb. and a gross weight of 10,450 lb., according to the manufacturers. That means that the machine carries as disposable load rather more than its own weight. The machine is a single-engined low-wing cantilever monoplane of all-metal construction, with the metal skin covering forming part of the stress-resisting structure.

Pan American Airways supply particulars of their latest acquisition, the Martin flying-boat *China Clipper*, a refer-

ence to the range and carrying capacity of which is made on page 472. In what is, presumably, its simplest form from the point of view of internal equipment, i.e., as a mail carrier, this machine weighs 23,100 lb. empty and its gross weight is 51,000 lb. Thus this latest example of American engineering skill carries as disposable load just over one and a quarter times its own weight!

A British Comparison

AN average figure for British flying-boats is about 62 per cent. of the tare weight as disposable load. We generally take our tare weight as the bare weight plus any internal standard equipment, and thus the comparison is not quite fair. But the Martin boat weighs, when equipped for ocean passenger transport, 28,216 lb., which still gives a ratio of gross weight to tare weight of 1.81; so that, even when very fully equipped, this machine still carries more than 80 per cent. of its weight as disposable load.

It must probably be admitted that the Americans have more experience than we in stressed-skin construction, and this may have helped them in getting their structure weight down, but it is difficult to believe that the saving can be anything like as great as these figures would indicate.

In the case of a machine of the Vultee class it does seem to be just possible that the difference between the stripped weight and the gross weight might be somewhere near the equivalent of the weight of the stripped machine, but for a flying-boat, in which the hull planking has to resist the intense local stresses imposed by hitting waves at 60 m.p.h. or more, one is apt to reply that it just can't be done.

By the time the weight of engines, tanks, essential equipment, and so forth, is subtracted from the empty weight given, there would seem to be approximately 13,000 lb. left for structure weight. Frankly, we hesitate to believe that even American engineers can produce an aircraft with a structure weight of only 25 to 26 per cent. of the total loaded weight. It will be interesting to see the Department of Commerce figures.

The Vital Operator

ANYONE who has flown in the pilot's cockpit of an air line machine during bad weather will agree the radio operator holds a position of very serious responsibility.

On the correctness and speed of his work depends the whole safety of the machine in many circumstances, and particularly during winter operations. If he is a person of intelligence he can make deductions from all manner of messages intended for or sent by other pilots, and can inform his pilot of facts about which the latter would otherwise have no knowledge. Furthermore, he must possess a very thorough understanding of the maintenance and working of the wireless equipment and must memorise the more important features of a very complicated code.

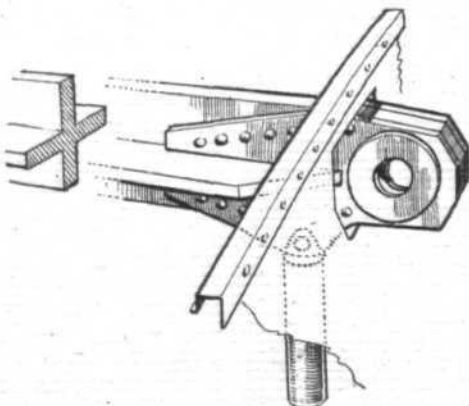
For this reason alone the radio operator should receive a salary commensurate with his responsibilities, and it should not be necessary for him to use the power of what can only be considered as a mutiny to force the air line operators to give him something that he ought to have. Force, in any form, should not be necessary to obtain one's rights in a modern civilisation.

THE SHORT SCION SENIOR

Comfort for Passengers and Economy in Operation the Main Features of New Four-engined Type : Ample Reserve in Spite of Low Power

FEW aeroplanes have combined to a greater degree economy in operation and comfort for the passengers than did the little Short Scion produced a couple of years ago. With an extremely modest power expenditure per passenger carried, that machine achieved success not only as an aeroplane but also as a seaplane.

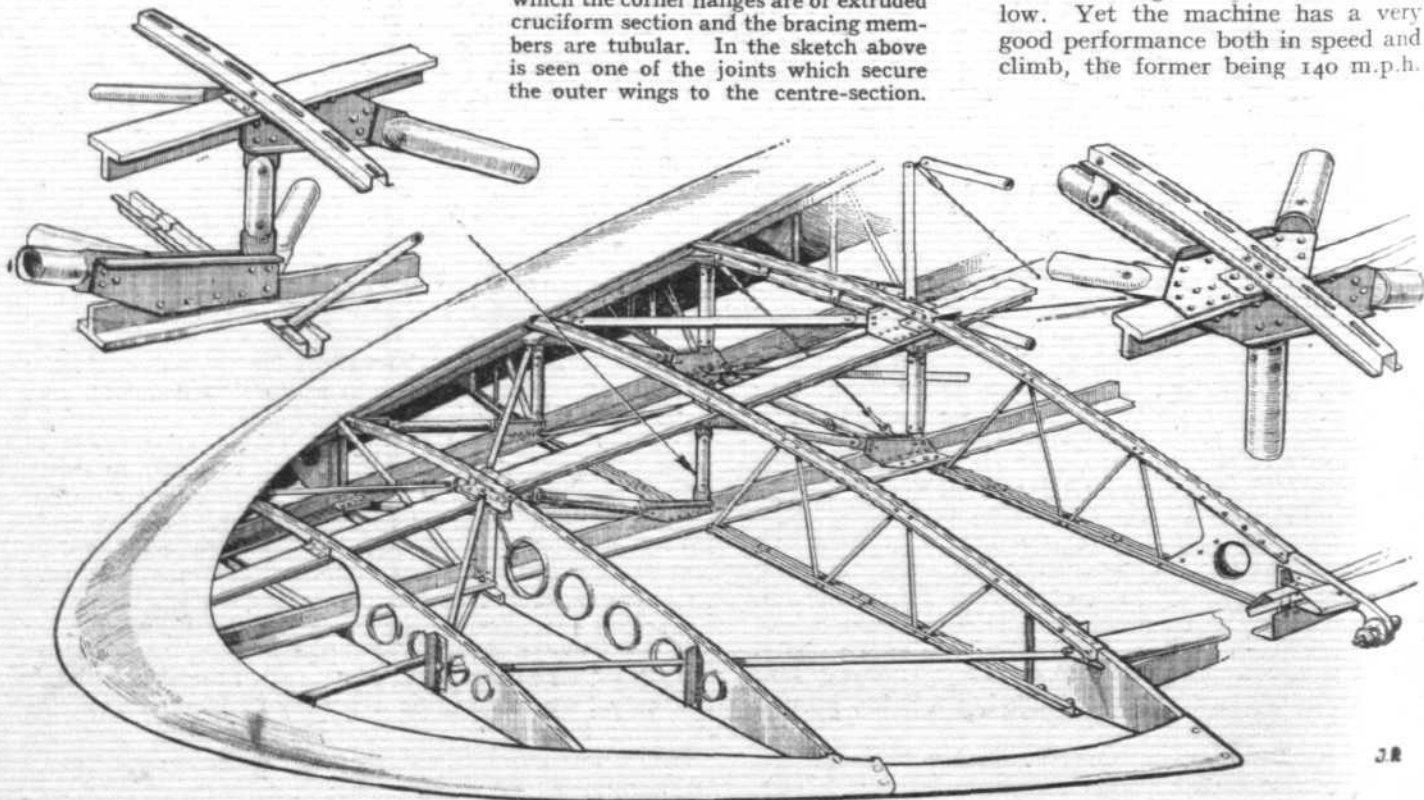
The general type having been found to be very efficient, aerodynamically as well as structurally, it was natural that Short Brothers, of Rochester, should produce a slightly larger version. Equally natural was the choice, for the new type, of four engines instead of two. The original Scion was just able to fly level with one of its two engines out of action, but obviously there could be little reserve of power. In the latest type, known as the Scion Senior, the aeroplane version is just able to keep in the air at low height with two of the four engines

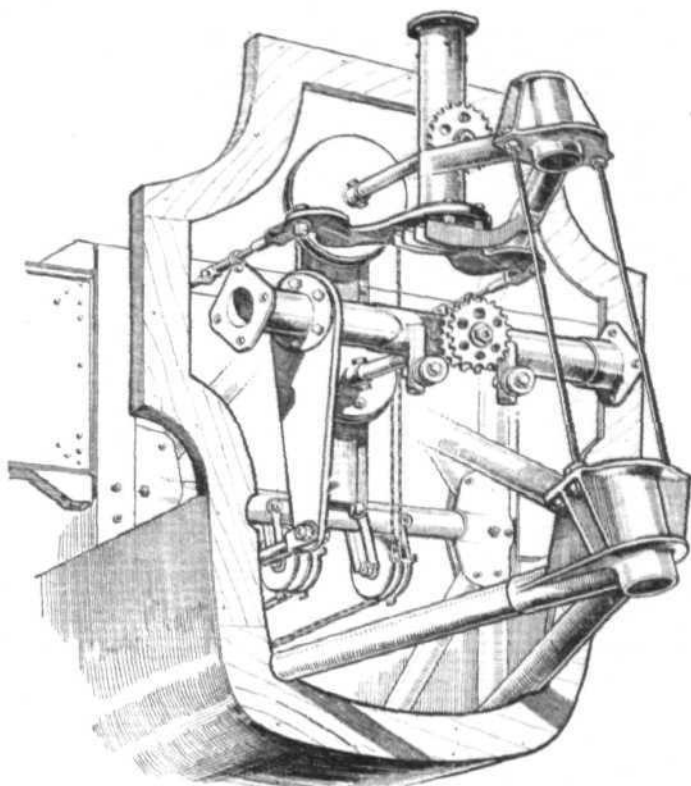
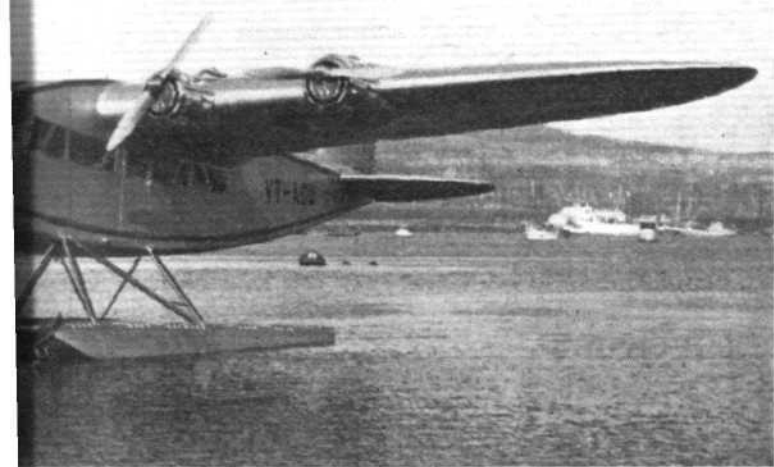


Details of the wing construction: The spar is in the form of a girder "box," in which the corner flanges are of extruded cruciform section and the bracing members are tubular. In the sketch above is seen one of the joints which secure the outer wings to the centre-section.

stopped. With one engine out of action the machine has a service ceiling of 6,500ft. (as a landplane) and 5,500ft. as a seaplane. Obviously, therefore, the risk of a hurried forced landing should be very remote.

Seating accommodation can, of course, be varied to suit the needs of individual purchasers. Normally the cabin will be arranged for ten passengers and one pilot. As the four Pobjoy Niagara engines develop a maximum of 90 b.h.p. each, the power expenditure per paying passenger is but 36 b.h.p., which must be regarded as remarkably low. Yet the machine has a very good performance both in speed and climb, the former being 140 m.p.h.

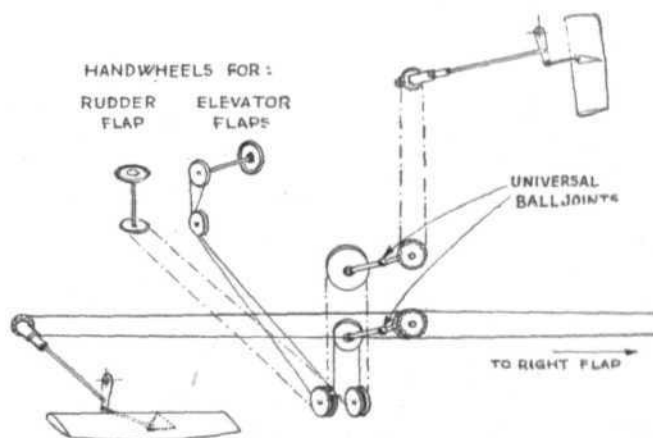




maximum for the landplane and 134 m.p.h. for the seaplane. The cruising speeds are approximately 125 m.p.h. and 120 m.p.h. respectively. These figures point to very efficient aerodynamic design. The mileages per gallon are $6\frac{1}{2}$ and $6\frac{1}{2}$ respectively, or 67 and 65 passenger miles per gallon. It should not be difficult to find uses for such a machine on unsubsidised work.

A feature of the original Scion was its quietness. The new machine, with four engines instead of two, does not appear to be any worse off in the matter of noise, and this should be another strong point in its favour. The first Scion Senior has just been put through its flying tests and will shortly be delivered to the purchasers, the Irrawaddy Flotilla Company. For use in the East this machine has rather fewer seats than the standard, and wickerwork seats are adopted for coolness.

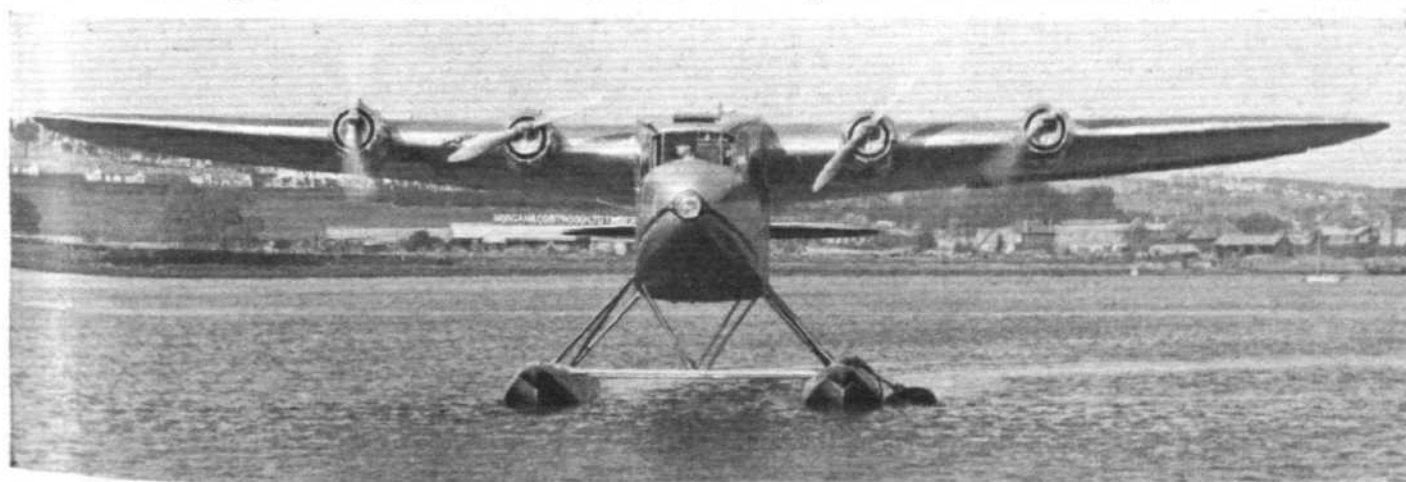
Fundamentally, the Scion Senior may be said to be the logical development of the earlier twin-engined machine, with which it shares its main structural and aerodynamic features. It is a high-wing cantilever monoplane of metal construction, with the four Pobjoy Niagara engines mounted abreast on the leading edge of the wing, into which they are neatly faired. The first machine of the type has passed its first flying tests as a seaplane, but the next to come along will probably have a wheel undercarriage. In our general arrangement drawings both



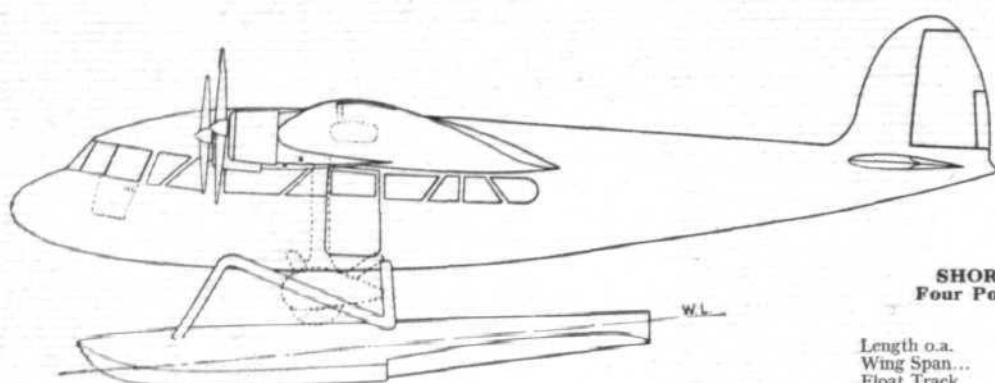
The grouping, in the stern, of the elevator and rudder control leads is shown in the upper drawing. The sprockets and small pulleys are for the rudder and elevator "tab" controls. The lower diagram shows how these control leads are arranged.

types of undercarriage are shown, and it will be seen that both fit into the design very well.

Owing to the fact that the fuselage of the Scion Senior



Clean aerodynamic design endows the Short Scion Senior with a good performance in spite of the relatively low power (four Pobjoy Niagara engines of 90 h.p. each). The top centre photograph on this page affords an interesting comparison between ancient and modern transport on the Medway, at Rochester. (Flight photographs.)



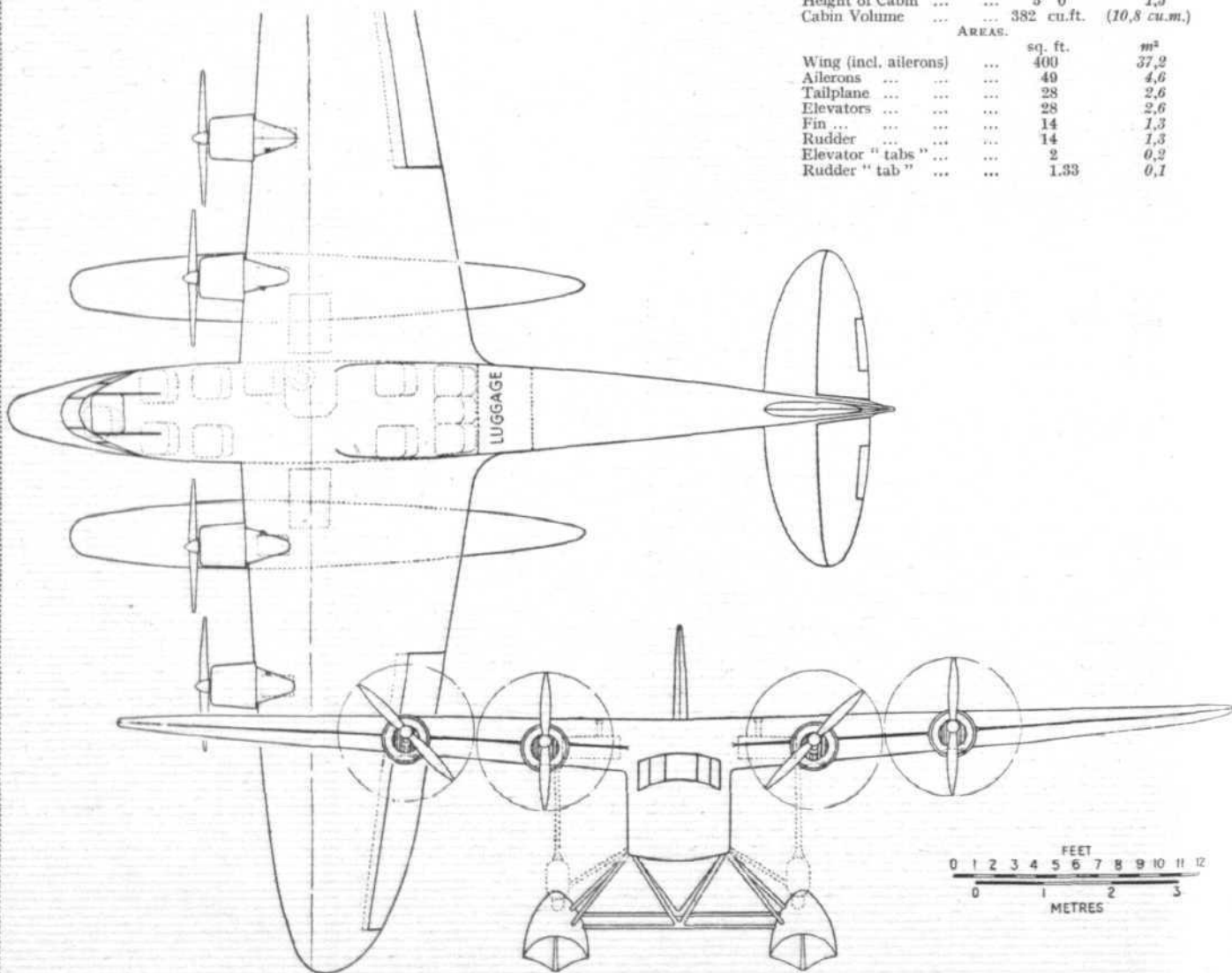
SHORT SCION SENIOR
Four Pobjoy Niagara Engines

DIMENSIONS.

	ft.	in.	m.
Length o.a.	42	0	12.8
Wing Span... ..	55	0	16.8
Float Track	12	0	3.6
Wheel Track	11	9	3.5
Length of Cabin ...	17	0	5.2
Width of Cabin ...	4	6	1.2
Height of Cabin ...	5	0	1.5
Cabin Volume ...	382	cu.ft.	(10.8 cu.m.)

AREAS.

	sq. ft.	m ²
Wing (incl. ailerons) ...	400	37.2
Ailerons	49	4.6
Tailplane	28	2.6
Elevators	28	2.6
Fin	14	1.3
Rudder	14	1.3
Elevator "tabs"	2	0.2
Rudder "tab"	1.33	0.1



WEIGHTS.

	Aeroplane.		Seaplane.	
	lb.	kg.	lb.	kg.
Tare (equipped) ...	3,546	1,608.4	3,886	1,762.7
Fuel (60 gals.) ...	462	209.6	462	209.6
Oil (6 gals.) ...	58	26.3	58	26.3
Pilot and Pay Load ...	1,684	763.8	1,844	833.2
Gross Weight ...	5,750	2,608.2	5,750	2,608.2

PERFORMANCE.

	m.p.h.	km/h.	m.p.h.	km/h.
Max. speed ...	140	225	134	215

	m.p.h.	km/h.	m.p.h.	km/h.
Cruising (3,200 r.p.m.) ...	127	204	121	194
" (3,100 r.p.m.) ...	122	196	115	185
Landing speed ...	55	88	55	88
Service ceiling ...	12,000	3,660	10,000	3,050
S.C. on 3 engines ...	6,500	1,980	5,500	1,680
Rate of climb ...	725	222	650	198
R. of C. 3 engines ...	400	122	300	92
R. of C. 2 engines ...	Just positive.	Just positive.	Just negative.	Just negative.
Range at 3,100 r.p.m. ...	420	675	400	643
Fuel consumption at 3,100 r.p.m. ...	18 gals.	(82 litres) per hour.		

is a good deal longer than that of the twin-engined Scion, while the depth is very little greater, the proportions are better and the result is an improvement in appearance, as the illustrations show.

Well-tried methods of construction have been followed

in the structure of the Scion Senior. The fuselage has a primary structure of welded steel tubes, while the wing structure makes use of duralumin in extruded and tubular form. The covering is fabric doped with Titanine.

The main spar has flanges of extruded duralumin, of

The shapely nose of the first Short Scion Senior. This machine has been sold to the Irrawaddy Flotilla Company for work in the east. Standing on one of the floats is Mr. J. Lankester Parker, Short's chief test pilot. (*Flight* photograph.)

cruciform section. This lends itself readily to the attachment of the tubular bracing members, the fork ends of which are simply bolted to the flanges of the cruciform sections. The structure of the original Scion was of similar type, and was found to be economical in weight of material, remarkably stiff in torsion, and entirely free from troubles with flutter. The wing ribs, as well as the ailerons and tail unit, are of normal Short construction as employed in flying boats for a great number of years.

The cabin, which has a volume of 382 cu. ft., measures 17ft. in length, has an average width of 4ft. 6in., and a mean height of 5ft. The windows are placed relatively low on the sides, and as the wing is above the fuselage the view from the cabin is very good, the window height being such as to facilitate looking down on the ground or sea without craning.

Control surfaces are of orthodox design, the ailerons being of the Frise type, with set-back hinges and aerodynamic balance. They are also mass-balanced. The tailplane is fixed, and the elevators are provided with trimming "tabs," while a similar "tab" is used on the rudder.

In the pilot's cockpit there is a very complete set of instruments (Smith's), including air-speed indicator, altimeter, fore-and-aft level, turn and bank indicator, compass ("Husun" Mark IIIa), oil-pressure gauges, and eight-day clock. The four rev indicators are of the Weston electric type. A very complete electrical installation is carried, including generator, battery, navigation lights, landing headlight in the nose of the fuselage, cabin lighting, and direct-cranking electric engine starters. Radio can be fitted, but is not included in the weights given.

Sixty gallons of petrol are carried in two tanks in the



wing roots, giving a cruising range of 400 miles for the seaplane and 420 miles for the landplane, in both cases cruising at 3,100 r.p.m. and at cruising speeds of 115 m.p.h. and 122 m.p.h. respectively. When cruising at 3,200 r.p.m. the respective cruising speeds are 121 m.p.h. and 127 m.p.h., but the ranges are then slightly reduced. The fuel consumption of the four engines at 3,100 r.p.m. is taken as 18 gallons per hour.

The payload of the seaplane, not counting the weight of fuel and oil for 400 miles, nor the weight of the pilot, is approximately 1,170 lb., and for the landplane the payload is 1,500 lb. The gross weight of the machine is in both cases 5,750 lb., and the tare weight of the seaplane, fully equipped but without radio, is 3,886 lb., while the landplane weighs 3,546 lb. The total disposable loads are 1,864 lb. and 2,204 respectively. In other words, the seaplane carries as disposable load 48 per cent. of its own weight and the landplane 62 per cent. For a machine of this type these figures are above the average.



The Short Scion Senior at her moorings in the Medway, off the works of Short Brothers. (*Flight* photograph.)

Correspondence

The Editor does not hold himself responsible for the opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for publication in these columns.

THE PRIVATE OWNER'S PUSHER

[3078] Your criticisms on the design for the Sykes monoplane (p. 407, October 17, 1935) were, equally with the designer's article, of considerable interest, but I was struck, and somewhat surprised, by your query: "Why place the seats in tandem?"

It may, in view of motor car practice, appear illogical, but in an aeroplane of this type I cannot see how it is possible to place them side by side. If they are so placed they obviously cannot be located on the centre of gravity, but forward of it in order to balance the weight of the engine and the fuselage, etc., aft. The question then arises: "What is going to happen if the pilot wishes to fly solo?"

It seems to me that tandem seating is a thing inseparable from the light aeroplane with pusher screw and engine behind the centre of gravity because the passenger, if a passenger is carried, is placed on the centre of gravity, as also the main petrol tank. Then it makes little or no difference whether a passenger is present or not and whether the tank is full or nearly empty.

If I am wrong, and if there is any solution to the difficulty of side-by-side seating which is not clear to me, I wonder if you would be so kind as to explain?

Northampton.

E. W. TWINING.

[The trim of an aeroplane with side-by-side seating would certainly be altered by the presence or absence of the passenger, but the same happens in a larger commercial machine, in which the passengers' seats are spread over considerable distance fore and aft. The tailplane trimming is usually sufficient to take care of this, and the same should apply to a two-seater. Alternatively, it would be possible, although slightly wasteful, to carry ballast instead of the passenger.—Ed.]

THE LIFE OF SIR SEFTON BRANCKER

[3079] I have read Captain Macmillan's biography of the late Sir Sefton Brancker, and I feel that, for the sake of accuracy and for the benefit of the younger generation, there are a few items which require explanation and/or correction.

Page 46: I think that a 100 h.p. Green engine was fitted to the Sopwith seaplane for the Circuit of Britain in 1913. [This was so.—Ed.]

Page 48: I am under the impression that the initials B.E. and S.E. represented Bréguet Experimental and Scout Experimental, respectively. ["B.E." is generally agreed to have stood for "Blériot Experimental," as stated by Capt. Macmillan.—Ed.]

Pages 54, 55 and 71: Are not the statements concerning organised factories and British engines somewhat misleading? I should say that both existed but were insufficient for a war of the magnitude of 1914-1918 campaign.

Page 75: The R.N.A.S. was formed before war was declared in 1914. [This is a point on which it is difficult to be dogmatic. The Naval Wing of the R.F.C. was formed in 1912, then gradually became to be known as the R.N.A.S.—Ed.]

Page 192: For "Kermit" read "Quentin." The former survived the war.

L. M. LILLEY.

London, S.W.1.

FIRST IN THE FIELD?

[3080] In the October 17 edition of *Flight* I notice that you state that England's first "Flea Club" was formed at Leicestershire on October 9, 1935.

Although I do not wish to enter into details of dates or times, etc., and appear too personal, I should like to draw your attention to the Kingsbridge Pou Club, which was formed at a meeting held on September 10th, 1935, as recorded in the minutes of the club. Possibly there are also a few more small clubs which were formed prior to this date.

The membership of the Club is limited for our present purposes, and we are well on the way towards completing our

first Flying Flea, all parts being made and assembled by the various members.

I should be glad to learn of any other clubs which have been formed, as it would be most interesting if intercommunication between such organisations could be arranged.

The headquarters of this Club are at "Homelea," Fosse Road, Kingsbridge.

R. B. BAILEY,

Kingsbridge, Devon. Secretary, Kingsbridge Pou Club.

THE FUTURE OF THE "POU"

[3081] I have read Mr. Boddy's article (in *Flight* of October 17) about the *Pou-du-Ciel*, and feel that the great interest shown in this subject is due to the fact that at last an aircraft is available at a remarkably low price. I know of one firm employed in making component parts for the *Pou* whose staff has been working overtime for several weeks past.

The whole atmosphere surrounding the *Pou* appears to me to be much too casual. I agree with Mr. Boddy that it is a pity that the design is not more conventional. There is plenty of money available to finance the manufacture of *Poux* and it should therefore not be difficult to arouse considerable interest in the manufacture of a small monoplane similar to the *Wren* designed by W. O. Manning and flown at Lympne in 1923. This had an A.B.C. engine of 397 c.c., a wing span of 37ft., a landing speed of 25 m.p.h., and a petrol consumption of up to 87.5 miles to the gallon. A modification of this, preferably, with an engine of somewhat greater h.p., should sell very freely to some of the 2,750 potential owners mentioned by Mr. Boddy. Let the manufacturer call it, if he likes, the *Wren-du-Ciel*, which after all sounds better than *Pou-du-Ciel*, and let him sell it in component parts. I disagree with Mr. Boddy in his views about a single-seater. I personally sometimes like to sit and ruminate above the earth entirely by myself, and, after all, there is then only one to please.

Mayfield, Sussex.

R. E. NIGHTINGALE.

[3082] Criticism of my article, "The Future of the *Pou*," published on October 17, was hardly unexpected. I should like to reply to the points raised by Mr. Maynard Thompson (October 24).

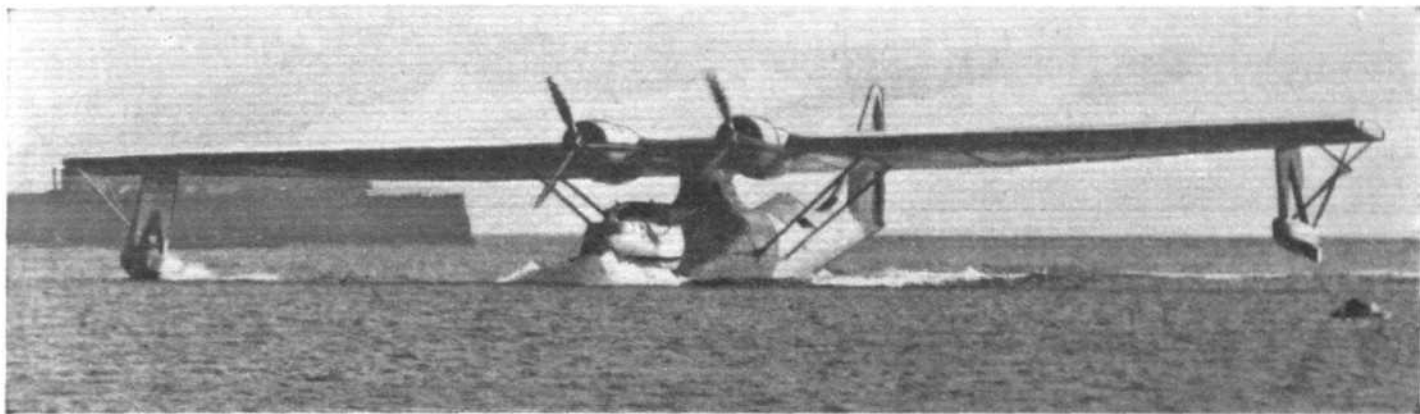
I am mainly concerned with the future of the *Pou* from the commercial viewpoint, and as a means of widespread development of private flying, rather than as a sporting, but limited, means of getting into the air at any price. My estimated price of a *Pou*—£150—corresponds to that asked by Abbott-Baynes Aircraft, Ltd., for a complete but unassembled machine. It may be possible to build an equally efficient machine in the spare bedroom for £75 less, but only the keener enthusiasts will adopt such methods. I quoted 8-10 h.p. because most *Poux* have motors of considerably under 1-litre capacity, a nominal h.p. of 8-10. I am aware that the Carden-Ford motor develops 28 b.h.p. at 2,800 r.p.m. and has a margin of 200 r.p.m. between cruising and all-out revs. I cannot agree that the average *Pou* has reliability on an exactly equal footing to that of any single-engined aircraft. Up to now *Poux* have been fitted with converted motor cycle and car units, which can hardly be put on an equality with pukka aeroplane motors, in addition to which these tiny motors have to run at, or very near to, maximum crankshaft speeds if a reasonable cruising speed is to be maintained under normal weather conditions.

Mr. Thompson quotes a cruising speed of 70 m.p.h. for a 28 b.h.p. *Pou*, but I believe that the Appleby *Pou* of that power has a maximum of 65 m.p.h. at cruising revs. If we translate this as a cruising speed of 60 m.p.h. my "ideal 40 h.p." machine starts with an advantage of 20 m.p.h. Other advantages that I would bring to Mr. Thompson's notice are: The comfort of an enclosed cabin against the *Pou*'s exposed single seat; that 80 m.p.h. is achieved at an engine speed several hundred r.p.m. below the cruising revs of the typical *Pou* mentioned, and a certain reserve of power in hand. 1

(Continued on page 460.)

THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS



LESS AND LESS : The Martin and Sikorsky companies have lately produced flying boats of startling aerodynamic efficiency and now the Consolidated company has contributed to the concerted "cleaning up" by making provision in this new P3Y-1 patrol boat for the floats to be hoisted up in flight to form the tips of the wing. Incidentally, this is the boat which made the fine Panama-Frisco flight recorded on this page last week. Sixty of these machines are being built for the U.S. Navy.

Rome Express

A new Breda military machine has averaged 250 m.p.h. on a trip from Milan to Rome.

Death of F. L. Marsland

Flight regrets to record the death of Mr. Frederick Marsland, the professional parachutist, who died last week from injuries received in a parachute descent near Kingston-on-Thames on September 4.

Back on the Bottom Rung

After many years the name of Gotha has a place in the aeronautical vocabulary, for the Gothaer Waggonfabrik, Gotha, has recently produced a two-seater training biplane with an inverted V air-cooled engine.

"Smithy"—A Temporary Return

Sir Charles Kingsford-Smith arrived back at Croydon last Thursday night, having met severe weather conditions near the Gulf of Corinth on his attempted Australian flight. Damage to the wings of his Altair, caused by ice, was repaired at Brindisi.

Twenty-five Years Ago

(From "Flight" of October 29, 1910.)

"Taking advantage of a beautiful moonlight night, Mr. Maurice Farman on the 19th inst. had his biplane brought out and indulged in a jaunt over the country round his aerodrome at Buc. He passed over Hunier, Guyancourt, and Voisins-les-Brettonneux, and afterwards landed without difficulty on his flying ground. This little trip demonstrated the possibility of using an aeroplane at night under favourable conditions."

A Back-staggered Ambulance

The first machine to reach Abyssinia to partake in Red Cross work is a Beechcraft with American markings.

Gone to the Wars

An aeroplane piloted on behalf of *The Daily Telegraph* by Mr. Charles French landed at Addis Ababa last Wednesday from Djibouti, French Somaliland. Mr. French was welcomed at the aerodrome by the Emperor, who made a thorough examination of the machine, which, bearing photographs, took off again for Djibouti to meet the Imperial Airways mail machine at Cairo. It was necessary to fly across Abyssinia at 10,000ft., as no warning had been possible.

The Next R.Ae.S. Lecture

The R.Ae.S. lecture taking place next Monday, November 4, has for its subject "The Prevention of Ice Accretion." It will be delivered by Mr. B. Lockspeiser, M.A., at the Institution of Electrical Engineers, Savoy Place, London, W.C.2, at 6 p.m.

Diesels in a Dornier

There has recently been produced at Friedrichshafen a new Dornier flying boat destined for service on the D.L.H. South Atlantic service. Seemingly a re-designed Wal, it has two Junkers Jumo compression ignition engines which give a cruising speed of 124 m.p.h. and a range of 2,485 miles.



MAKING UP HIS MIND : After finding that half the undercarriage of his Boeing had attempted to sever all connections with the machine, this U.S. Army pilot cruised round for 2½ hours trying to decide if he should try to land it or make an exit with his Irvin. He chose the latter course.

Private Flying



Topics of the Day

Holding the Interest

A PART from the hundred and one little games which may be invented by the intelligent instructor for the sole purpose of retaining the interest of a novice after he has obtained his licence, there is one outstanding, but sometimes expensive, method.

The grading of pupils by competitive means, the fixing of hourage limits before special liberties are obtained, or the steady encouragement of cross-country flying—none of these compare with the use of variegated machines in the school fleet and with the purchase of just one new and amusing type every year.

Tell a pupil that after five more hours he may fly this cabin monoplane or even that obsolescent but still entertaining single-seater and he will race through his five hours just as if he had suddenly been left a fortune. Years ago, when there was, practically speaking, only one type of club machine, people became so bored with the sight of the dithering rocker gear that they prayed for a chance to fly a reconditioned S.E.5 even if the unexpected aileron drag which it displayed was likely to put it on a wing tip during the very first landing.

New Types

IN those days amateur pilots changed their clubs in dozens and some drove as much as eighty miles to others where enterprising committees had purchased something new and a little strange. I once spent several pounds which I couldn't afford for the pleasure of lying awake at night in a panic at the thought that my instructor might consider me safe enough to fly a decrepit cabin aeroplane on which no dual was possible. He did consider—and I managed to get it back into the aerodrome with no more damage than a cut lip, which I had bitten in unnecessary excitement during the approach.

Naturally enough, a variegated fleet is liable to be more expensive in operation than a row of entirely similar machines, but if the club feels unable to take a mild risk the members can be sounded to see whether they would be prepared to pay a little more for every hour on the new type. Needless to say, the machine has not necessarily to be new in the purchasing sense.

Discovering the Hornet

LAST week I had a chance of flying the D.H. Hornet Moth—actually that owned by the London Aeroplane Club. Previously, the demonstration model had always appeared to be on a journey when I visited Hatfield, and, in any case, one understood that interested parties formed an imaginary queue extending from Hatfield to Stag Lane and that ordinary persons had to sign the register and take their turn.

However, to be instructed was much more useful than to be merely "shown how." Darkness was descending upon the face of the earth and a thickness filled all the available atmospheric gaps when the great event took place, so there would be little value in any opinions expressed about the Hornet as a machine. Furthermore, everything worth saying would appear to have been said.

As a pupil I found the Hornet to be a very definite joy. There was none of this "What? . . . Yes? . . . You've got her. . . . Oh, have I got her?" business. The pupil just talks and the instructor just talks more. The latter can even watch the pupil being cross with himself because his approach is sloppy. Unfortunately, too, the instructor can see the slightly frightened expression on the pupil's face as he fusses unnecessarily with the controls, and the pupil can see the instructor's hand chasing the stick about during a ragged hold-off. No nervous instructor with firm stick-holding tendencies will get away with it!

Once upon a time, while practising forced landings in a low-powered tandem biplane—a process in which the instructor opened up when he saw that I was (or was not) going to get into a chosen field—I was reprimanded for making a too-steep, gently turning climb. I thought the instructor was flying the machine, and said so. *That* will not happen with the Hornet.

More Psychology

INCIDENTALLY, the whole business of advanced instruction is particularly interesting from a psychological point of view. For a long time I have been firmly convinced that the amateur with a fair amount of general flying experience is absolutely at his very worst when he has an instructor with him.

Desperately anxious to do well in the eyes of the mighty, he is often a bundle of nerves and usually errs on the wrong side in an endeavour to be sure that no cardinal sins are committed. If, through early "conditioning," he has a temperamental fear of undershooting and of gliding too slowly he almost invariably comes in too high and too fast, knowing perfectly well that he is putting up a bad show. Only when he is alone in the aeroplane does he really learn how to fly it properly—provided, of course, that he has done a sufficient amount of flying to be able to see and to correct his own faults.

Of course, "try-out" circuits in a strange aeroplane rarely give the pupil a chance of getting properly into his stride for there is such a relatively large number of things to be done in a very short time. On the few occasions when I have been left to myself in a strange type I have climbed straight up to 2,000 feet and practised turns, with and without engine, and sideslips at different speeds, terminating the exhibition with some very slow flying.

INDICATOR.

FROM the CLUBS

Events and Activity at the Clubs and Schools

YEADON

The Yorkshire Aeroplane Club, Ltd., recorded 21 hr. 50 min. flying last week. The Aeronca-J.A.P. was demonstrated, and Mr. J. Barber went solo.

READING

Mr. A. Can has joined the club to take his "B" licence, and Mr. A. J. Vaber and Mr. H. A. Knight intend to take their "As." Weather kept last week's flying times down to 19 hr. 55 min.

SOUTH STAFFS

At a highly successful supper dance held in the Clubhouse last Saturday, a warm welcome was extended to Flt. Lt. D. G. Allison, R.A.F.O., who has been appointed instructor to the club. Messrs. Rednall, Blumfield and Waters have become members.

WITNEY AND OXFORD

A liberal helping of bad weather was spread over the fortnight ending October 26, during which flying hours totalled 25, twelve hours being solo. However, Mr. George Howard-Davies passed his "A" licence tests, and Messrs. Ashton, Worsley and Kieser became members.

CARDIFF

One of the club's Gipsy Moths will soon be in service again after overhaul, and by the time it returns two or three Moths will be in use.

Last week Mr. D. L. Davies became a flying member. A Jubilee Monospar, with Mrs. Villiers Stuart as passenger, went through *en route* to Ireland for the second time in a month. Mr. R. L'Estrange Malone flew over in a Hornet Moth and Mr. Norman Edgar appeared in an Aeronca.

HANWORTH

Flying was again handicapped by indifferent weather, chiefly by morning fog. However, flying times totalled 31 hr. 35 min. Messrs. Mavrogordato and Oliver have passed their instrument flying tests, and Messrs. Tarn, McClelland and Wright have become members.

Mr. Ince is housing his Percival Gull in the club hangar, and Mr. Melrose has left for Croydon, where it is understood he will take off on his flight to Australia.

HERTS AND ESSEX

A number of club pilots flew the Aeronca-J.A.P. which was demonstrated at Broxbourne the other day by Mr. Reed.

Bad weather caused the postponement of the "Janet Lady Brickwood" Challenge Cup Competition.

The annual dinner and dance will be held at the Park Lane Hotel on Thursday, December 5.

Flying time for the fortnight ending October 23 was 110 hr. 20 min. Messrs. Luin, Newall, Reyner, Bahman, Bakhtian, Gardner, Goss and Lawson, an Air League member, have joined. Mr. N. F. McLeod has gone solo, and Mr. C. F. Tulloch is nearing the solo stage. F/O. R. Rendle, A.A.F., has become an instructor.

LIVERPOOL AND DISTRICT

Wind, rain and mist prevented more than 24 hr. 40 min. flying last week. There will be a firework display at Hooton on November 5.

REDHILL

Night flights for the "B" licence were made last week by Messrs. E. G. Reed and V. A. Cash, and Mr. B. A. Long obtained his Class "B" blind flying certificate. Flying times totalled 51 hr. 55 min.

LONDON

Another Tiger Moth has been added to the club's fleet, making five of this type in use.

Last week, during which Mr. D. Ross went solo, club machines put in 70 hr. 10 min. flying.

C.A.S.C.

The strongest wind experienced for some time prevented members doing more than 1 hr. 40 min. flying on Sunday.

Mr. Kronfeld brought in a Drone for refuelling, having taken 1½ hours to fly from Ipswich to Fen Ditton against a strong head wind. A Service Hart landed with a broken centre section drag wire, a replacement for which was flown up from Hendon.

BROOKLANDS

A landing competition was held last Sunday and attracted a large number of entries, the successful one being Mr. Mainwaring.

Dr. Ridsdell, Mr. Lord and Mr. Glossop have become members, and first solos have been made by Mr. Barlow and Mr. Bamford. Mr. Tomkins has received his "A" licence. The second instructor, Mr. Allott, is away at Sywell doing annual Reserve flying training.

It has been found necessary to reorganise the Service Department at Brooklands. Extensive building operations are in progress, and the new premises will include up-to-date dope shops, and every modern facility for executing the annual C. of A. Mr. A. H. Voss, who has had experience at Heston, with National Flying Services and Hawker Aircraft, Ltd., has been appointed works manager.

CINQUE PORTS

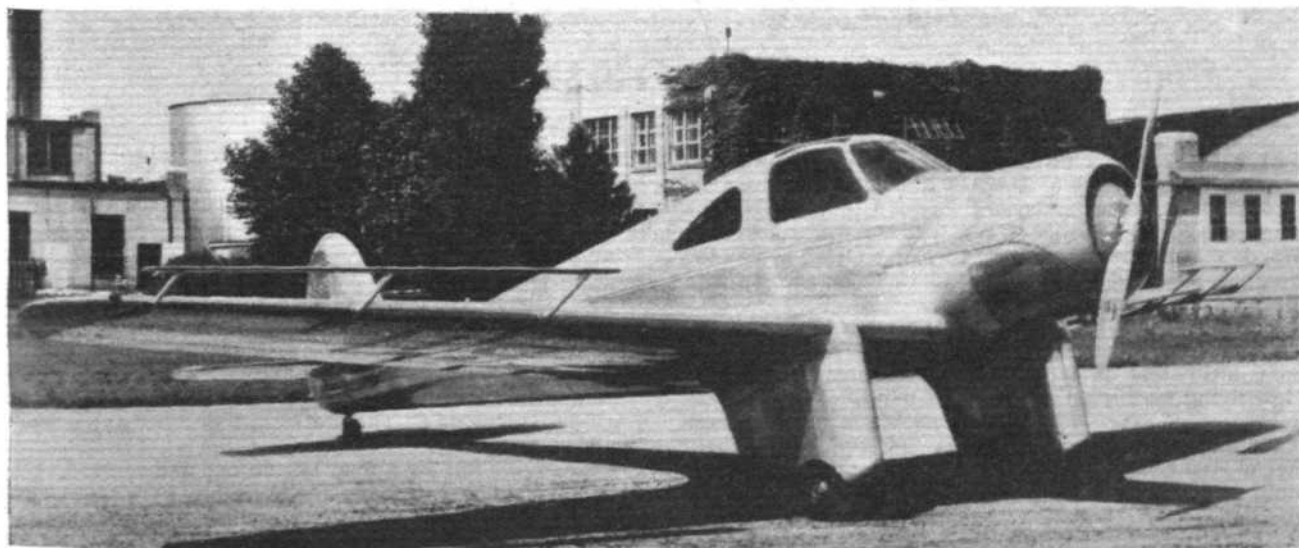
Mr. J. A. Mead, of the Welsh Guards, Mr. Robert G. Doig, the Canadian airman, and Mr. C. D. Stephenson became members last week. Mr. de Pury, a brother of Miss Jeanne de Casalis, went solo. Miss de Casalis herself is making excellent progress with her flying and should shortly qualify for her licence.

Mr. Doig made a successful test flight with his *Pou* last Friday, reaching a height of over 15 ft. and flying straight for 200 yards. The wing section is to be modified.

Fog at Croydon caused Capt. Morton, of British Continental Airways, to put down his Rapide at Lympe on Tuesday night. Visitors included Mr. Jack Armour and M. Marcel Robin in an Eagle, Mr. "Tommy" Lipton, who had made a non-stop run from Munich in his King's Cup Falcon, and Mr. Tony Morris in Mr. Van Marken's Tiger.

Miss Rennay Tailour, a former secretary of the late Mr. Arthur Henderson, is completing tests for her "B" licence.

Forty-three hours' flying was registered last week.



IS CURTISS RIGHT? This, the new Curtiss-Wright Sparrow, described in detail on pp. 461-2, is that company's idea of an aeroplane for the masses. No one will deny that it has numerous attractive features—side-by-side seats, a creditable performance and good speed range. The fixed slots may be seen to advantage in this photograph.

Private Flying

CAMBRIDGE

No less than 61 hr. 30 min. flying was logged last week. Messrs. Parker and Lencock became members.

R.A.F.

H.R.H. the Prince of Wales has graciously consented to become Patron of the Royal Air Force Flying Club.

P/O. C. G. Holland Martin, F/O. A. J. Sayer, Major A. Graves and F/O. J. Worall have become members.

CASTLE BROMWICH

Mrs. Maynard has gone solo, and Miss B. Briggs has passed her "A" licence tests. The flying times for the fortnight ending October 24 amounted to 24 hr. 30 min. dual and 24 hr. 55 min. solo. There are six new ordinary members.

HESTON

The Heston incubator has hatched another little clutch of pilots. Mr. Gilbert Miller blew into the Air Ministry recently and collected his coveted "A" licence an hour before he left for the United States. He intends to buy his own machine, but will have it chauffeur-driven. His own training will enable him to share the responsibility when decisions have to be taken.

Other licences have been gained by Mrs. Peter Bathurst, Mr. R. Febrey, of the Civil Service, Mr. A. T. Chapman, an engineer, and Mr. R. M. Wilson, of the Household Brigade Flying Club, who was at one time secretary to the Governor of the Bahamas. Mrs. Peter Bathurst, by qualifying for her "A" licence, adds one more to the list of married couples who fly. Another couple, Mr. and Mrs. Jock Hanbury, are learning simultaneously with the usual keen competition. Mr. Hanbury has just made his first solo and his wife is following him closely.

TOLLERTON

Owing to bad weather on several days of the week, only 16½ hr. were flown at Tollerton during the week ending October 24. Mr. Ken Howitt qualified for his "A" licence.

The chief event of the week was the club's annual dinner and dance, which was held on the 24th at the Mikado Cafe, Nottingham. There was a good attendance, both of home members and visitors from other clubs, and among the diners were the Lord Mayor and Lady Mayoress of Nottingham and Sir Albert and Lady Ball. The Lord Mayor spoke of the progress which had been made at Tollerton during the past year; he said that even greater developments could be expected in the near future. Sir Albert Ball also spoke on the past and future of aviation, and the speeches were replied to by Capt. L. W. Hall.

The Air League and the "Pou"

THE Air League of the British Empire, which, it will be remembered, "fathered" the *Pou-du-Ciel* on its introduction into this country, is now offering a new service to constructors. Realising that amateurs may be disappointed in the results they achieve, by reason of faults in workmanship or rigging, or inexperience in piloting, the League has arranged, with the co-operation of the British Gliding Association, for district inspectors to visit amateurs on request. For a fee of 10s. 6d. and travelling expenses, the inspector will examine and advise on the materials and workmanship of the airframe before the wings are covered. The League, incidentally, will be glad to hear of ground engineers or other qualified men who could help in this direction.

Secondly, when the machine is ready for flight the Air League will send an experienced *Pou* pilot (Flt. Lt. A. M. Cowell) to

check the rigging, make a test flight, and give hints on piloting. The fee for this service will vary according to the number of machines which can be tested at a given aerodrome, but is likely to range from £2 to £5, plus travelling expenses.

Air Commodore Chamier states that the League is always glad to hear (at 19, Berkeley Street, London, W.1) from any *Pou* constructors who require advice.

Gravesend Development

A LITTLE more than a month ago Airworthiness, Ltd., was formed to take over the business of Gravesend Aviation Ltd., at the Gravesend airport, this business including the schools of flying and engineering and the overhaul department.

Since that time a considerable amount of new equipment has been installed in the repair workshops and engineering school. Both of these are very busy, and several "A" licence pilots of the school are taking the engineering course.

Mr. H. C. Brown, who is a G.E. of many years' standing, is the managing director, and he is also in charge of the aviation school in the cadet ship *Worcester* at Greenhithe. The other directors are Mr. F. W. Humphrey, J.P., the Hon. A. B. Mildmay (both private owners) and Mr. G. Heeley.

Unity in Yorkshire

A PRIVATE proposal for the formation of an Association of Yorkshire Flying Clubs has recently been put forward and the committee of the York County Aviation Club has decided to support this scheme. The preliminary meeting, to which the Secretary of the York County Club is inviting other clubs, will be held shortly.

As explained in the club monthly report, the object of such an association would be to strengthen the general position of all clubs and, in particular, to give assistance to smaller organisations if difficulties should arise. It is particularly interesting to notice that the gliding clubs will also receive invitations, so that the existing aeroplane clubs may be in a better position to encourage the gliding fraternity. Certainly it would seem to be in the interests of aviation in Yorkshire that such an association should be formed.

Flying the Drone

IT is not generally known that the Drone Flying Club, of Maylands Aerodrome, Romford, Essex, has now been in existence for three months. During the week-end before last, three of the members, of whom there is already a fair number, made their first Drone solos, and quite a number are on their way towards the solo state.

The instructional methods are interesting. Some twenty flights are made in a dual control glider at 3s. a flight, after which the pupil has two hours or so on a Redwing side-by-side seater biplane at £2 an hour. A further ten flights in the glider enable the pupil to go solo on the B.A.C. Drone at a rate of 16s. an hour. Membership of the club costs £2 per annum for pilots and 10s. a year for ground members, and the Drone can be hired at £1 10s. an hour to approved non-members. A clubhouse is being erected at Romford, and this is nearly completed.

CORRESPONDENCE

(Continued from page 456)

agree that a C. of A. would be needed, but one hopes that *Pou* owners will take pains to keep their machines airworthy, though no C. of A. is necessary. I have in mind an engine developing 40 b.h.p. at cruising revs, which indicates a capacity around 2 litres (nominal h.p. 16-20), so that while the running expenses would be greater than those of an 8-10 h.p. *Pou* they need not be excessively so.

Coming to the freedom of *Pou* pilots, after a limited "A" licence is granted it is necessary to insure for third party, which may ultimately be a fairly costly business. The question of low flying over populous districts requires to be clearly defined, because so many aerodromes and landing grounds are now surrounded by masses of houses. Certainly it would seem that a *Pou* pilot learning to fly without a licence of any sort would be advised to choose his aerodrome carefully, or he might find himself breaking the law, or getting into unfortunate situations, while within the three-mile radius of the landing ground.

Mr. Thompson is surprised that business men do not use *Poux* regularly in lieu of a car. Consider how many private pilots in this country use aeroplanes at all regularly as a

means of serious transport, and ask a few of them how long it was, and how much it cost them, before they reached the necessary standard of pilotage, and the much-talked-of boom in private flying may not seem so near. Many people can drive cars fairly effectively though they have not passed the official test, but serious air pilotage is not quite the same thing. However, this is rather outside the *Pou-du-Ciel* argument.

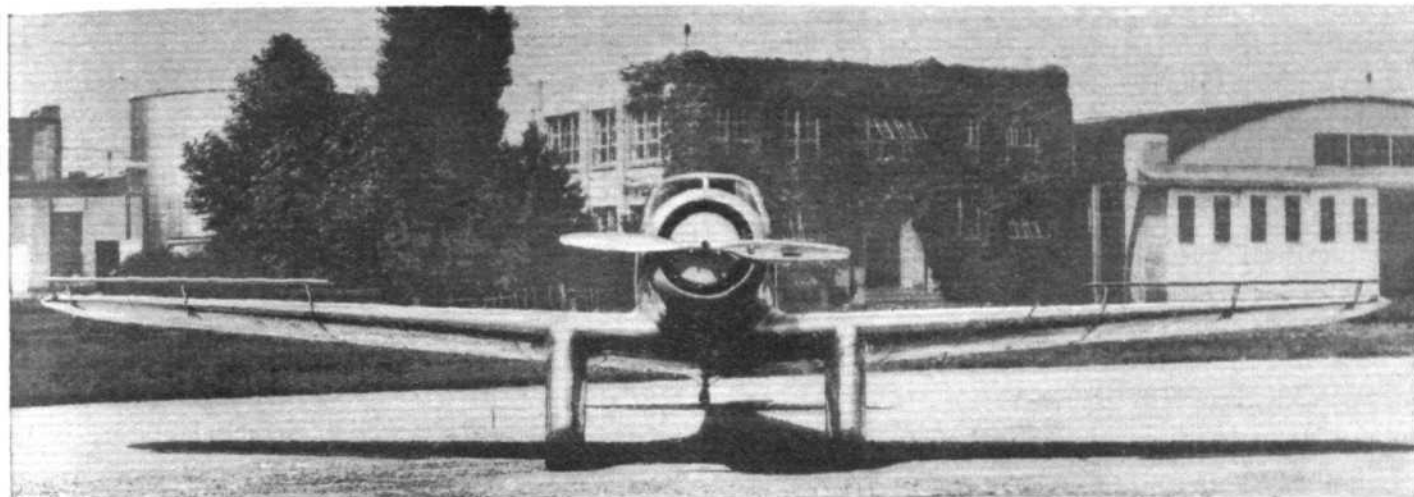
In conclusion, I retain my opinion that while the *Pou* may provide excellent sport for a small number of extremely enthusiastic aviators, it has no commercial future. In your Editorial comment ("The Outlook," October 17) you likened the *Pou* to the £2 motor cycle. Such second-hand motor cycles provide fun for a few, but no one can pretend that they have any significance in the Trade, or any bearing on the trend of motor cycle design. Further, one has only to recall the fate of the many small concerns which, just after the Armistice, attempted to market cycle-cars planned to tap the latent demand for "motoring for the million," to be very dubious of the future of the *Pou-du-Ciel*.

London, S.E.27.

W. BODDY.

TEMPTING the U.S. PRIVATE OWNER

The Curtiss Sparrow : Stressed Skin : Fixed Slots : 131 m.p.h. on 90 h.p.



Two outstanding features from the aerodynamic standpoint are the fixed slots and the ailerons, which are locked against downward travel past the neutral position.

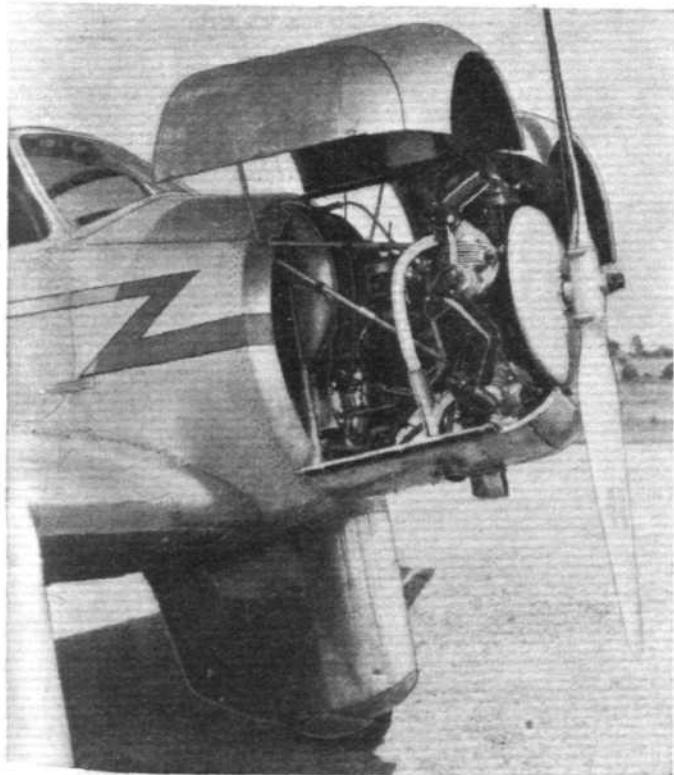
AS regular readers of *Flight* will know, the American Bureau of Air Commerce, under the direction of Mr. Eugene Vidal, has been sponsoring a scheme by which the citizens of America would be able to purchase a small, low-priced, safe aeroplane. The contribution to this scheme of the Curtiss-Wright Airplane Co., of St. Louis, Missouri, is the Sparrow, a side-by-side two-seater, all-metal, stressed-skin, low-wing, cabin monoplane which bears a striking resemblance in appearance to the latest high-speed single-engined transport machines.

The gauges of the metal skin used throughout are the same as those used on commercial types of much greater weight, the material being 24ST Alclad.

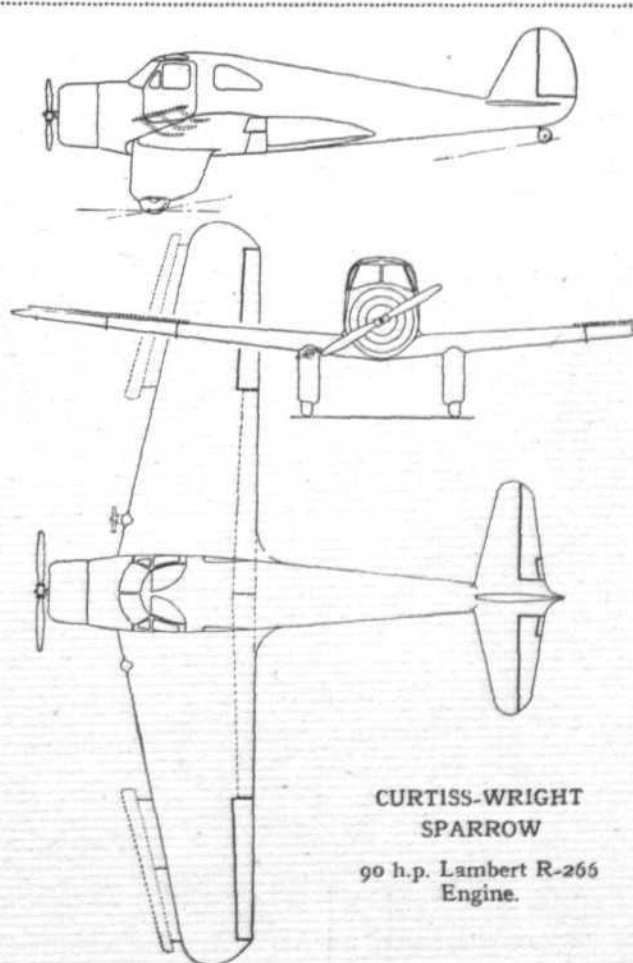
Five spars are embodied in the full cantilever wing, the skin of which is designed to carry the loads. In order to improve

lateral control, the ailerons, which are of metal construction, are locked against downward travel past their neutral position. This is accomplished by a combination of an idler link in connection with the control rod whereby the pulleys are made to rotate idly when the aileron reaches the neutral position on its downward travel, even though it is rigidly and directly connected with the opposite aileron control mechanism. The attachment of the aileron to the wing is accomplished by a full-length piano-type hinge.

A split flap extends over 70 per cent. of the wing span, and



Engine inspection is facilitated by this collapsible N.A.C.A. cowling which is hinged at the top.



is operated by a rotating handle located at the pilot's right hand near the bottom of his seat. Unlike more conventional flap-actuating mechanisms, this is so operated through torque tubes that the load on the handle remains almost constant regardless of air load. The mechanism is attached to the flap at five points, each position being adjustable.

Another outstanding feature is the provision of permanently open slots formed by placing auxiliary aerofoils above, and ahead of, the main wing. It may be recalled that tests with a similar arrangement on a Fairchild F.22 monoplane during 1933 gave an increase in lift coefficient from 0.675 to 0.98.

Of all metal monocoque construction, the fuselage consists of raised rings, stringers and skin assembled as in modern American transport machines. The side-by-side two-seater cabin is fitted with dual controls, the right-hand set being easily removable. There is a sloping windscreen, side windows, and a large transparent panel in the roof. Two car-type ventilators are installed in the top of the windscreen, and there are two rear view mirrors. The ventilators are of the type which suck air from the cabin, fresh air being taken in through a duct opening in front of the engine, assuring pure, uncontaminated air. Two large doors, one on each side, give access to either front seat. The seats are fitted with spring cushions, and are adjustable fore, aft and vertically.

The flying controls are conventional in design except for the fact that the control column is used in an inverted position.

Both tailplane and fin are fixed, but there are metal trimming tabs on the elevator operated by a Breeze irreversible mechanism. The elevator and rudder (and, in fact, the whole of the *empennage*) are of metal construction, the elevator hinge being of a piano type extending from the tip to the root.

Monocoque "trousers" enclose the undercarriage mechanism. Full air wheels are used, and the oleo legs have a roin. stroke. The gear is held in the take-off position by a small latch embodied in the oleo leg which is automatically released on the

CURTISS-WRIGHT SPARROW.
Two-seater Light Monoplane.
Lambert R-266 Engine, 90 h.p.

DIMENSIONS.					
Span	...	...	...	...	35ft.
Length	...	...	...	...	25ft. 6½in.
Height	...	...	...	...	7ft. 2in.
Wing area	...	...	...	...	174 sq. ft.
WEIGHTS AND LOADINGS.					
Weight empty	...	...	...	...	1,154 lb.
Disposable load	...	...	...	...	646 lb.
Gross weight	...	...	...	...	1,800 lb.
Wing loading	...	...	...	...	10.3 lb./sq. ft.
Power loading	...	...	...	...	19.9 lb./h.p.
PERFORMANCE.					
Maximum speed	...	...	...	...	131 m.p.h.
Cruising speed	...	...	...	...	115 m.p.h.
Initial rate of climb	...	...	...	...	500 ft./min.
Stalling speed	...	...	...	...	44 m.p.h.
Ceiling	...	...	...	...	17,000 ft.
Cruising range (normal)	...	...	...	...	496 miles.
Cruising range (maximum)	...	...	...	...	1,150 miles.
Fuel consumption at cruising speed	...	...	...	...	4.7 gall./hr.

first turn of the flap. Hydraulic brakes both of the foot and parking type are incorporated. The parking brake is a simple sliding control on the instrument board.

A 90 h.p. Lambert R-266 5-cylinder radial is mounted on a steel tubular structure, the engine itself being supported with rubber bushings to absorb vibration.

The maximum fuel capacity of the Model 19L Sparrow is 43.3 gallons carried in two tanks located on each side of the fuselage in the wing. Five gallons in the left tank are held in reserve. The oil tank, of 4.2 gallons capacity, is attached to the fireproof bulkhead directly behind the engine.

A MILITARY VULTEE

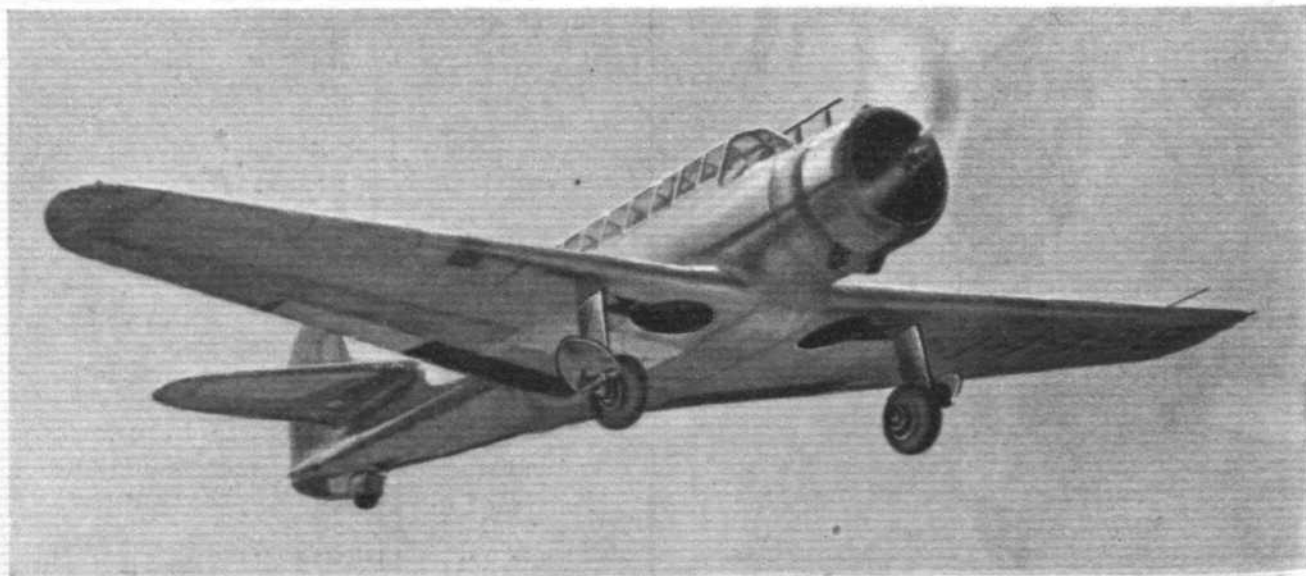
Attack-Bomber Type : 2,700 Miles at 192 m.p.h. with 1,100 lb. Bomb

PERHAPS the most universally admired single-engined transport monoplane produced in the United States in recent years is the Vultee V-1A monoplane, a flying trial of which was described in *Flight* of October 3 this year. The Airplane Development Corporation (a division of the Cord Corporation), whose works are at Glendale, California, and who produced this machine, have now built for the export market (mainly, it is believed, with an eye on the Orient) a single-engined attack-bomber monoplane which might be regarded as a military development of the V-1A.

The Vultee method of construction was described in detail in *Flight* of March 22, 1934: for the purposes of this descrip-

tion the new machine will be dealt with from the military standpoint.

It is classed by the manufacturers as an attack-bomber type, which means that it is suited to "contract patrol," or ground strafing work, in addition to long-range bombing. Standard U.S. Army load factors for attack machines have been used in the design of the structure. Basically the machine is an all-metal low-wing cantilever monoplane of metal-stressed skin construction, fitted with a Wright Cyclone radial engine, an inwardly retracting undercarriage, flaps and C.P. airscrew. The *empennage* of the new military machine is of a type favoured in Germany, with the tailplane and elevator placed high on the fuselage and forward of the rudder.



Like its civil predecessor, the new Vultee has an inwardly retracting undercarriage. This view shows the "German" tail unit to advantage.

One striking feature of the design is the long cockpit enclosure for the pilot and observer. The pilot, who releases the bombs, is seated just aft of the leading edge of the wing, and the observer, who also has a set of controls, is roughly over the trailing edge. Protection for the pilot in the event of nosing-over has been provided by a tripod immediately behind the pilot's head, capable of sustaining six times the gross weight of the machine.

Even as a bomber the machine carries four 0.30in. calibre Browning-type MG-40 machine guns installed within the in-board leading-edge section of the outer wing panels, two guns being located in each wing. Stainless steel ammunition boxes of 600 rounds capacity and ejection chutes are provided for each gun. The guns are manually charged and electrically fired by a pistol trigger grip on the control column. Another 0.30in. calibre Browning gun is provided for the observer.

Bombs are carried both internally and externally. Racks are provided in the fuselage and wing for twenty 30lb. bombs, the internal racks being sufficiently deep to permit the carriage of either chemical or fragmentation types. Stainless steel guide chutes are provided to position each bomb separately, and to guide it until it has left the machine. Doors are located at the bottom of these chutes, which are inclined 10 degrees aft of vertical.

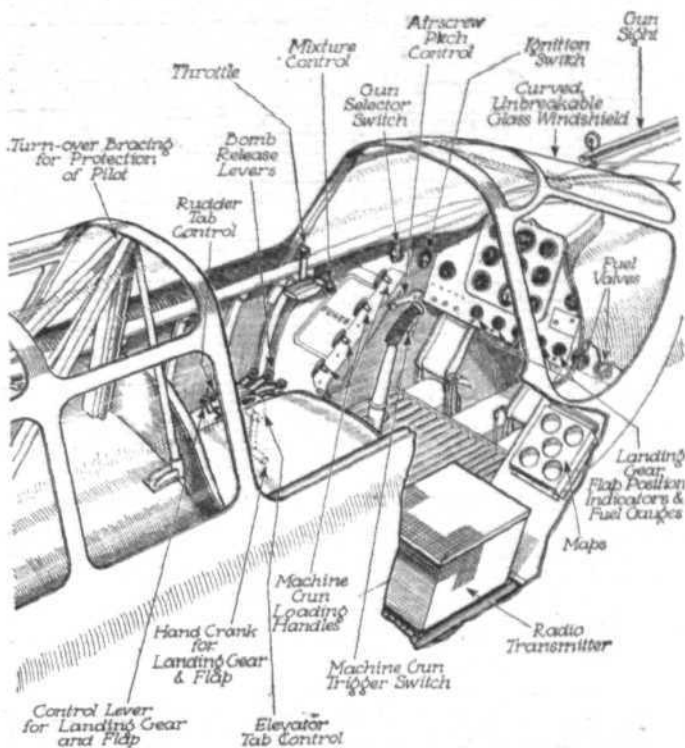
VULTEE ATTACK BOMBER.

WEIGHTS.

	Bomber.	Attack.
Weight empty	5,200 lb.	5,200 lb.
Military load	1,625 lb.	1,167 lb.
Crew	400 lb.	400 lb.
Oil	225 lb.	127 lb.
Fuel	3,000 lb.	1,608 lb.
Gross weight	10,450 lb.	8,502 lb.

PERFORMANCE.

	BOMBER		ATTACK	
	Wright Cyclone SR-1820-F52	Wright Cyclone SR-1820-F53	Wright Cyclone SR-1820-F52	Wright Cyclone SR-1820-F53
Maximum speed	208 m.p.h. at 5,800 ft.	216 m.p.h. at 11,000 ft.	226 m.p.h. at 5,800 ft.	237 m.p.h. at 11,000 ft.
Maximum speed at sea level.	194 m.p.h.	188 m.p.h.	210 m.p.h.	204 m.p.h.
Cruising speed (67 per cent. power).	180 m.p.h. at 16,400 ft.	192 m.p.h. at 20,700 ft.	213 m.p.h. at 16,400 ft.	217 m.p.h. at 20,700 ft.
Stalling speed...	70 m.p.h.	70 m.p.h.	65 m.p.h.	65 m.p.h.
Rate of climb at 800 ft./min. critical altitude.	710 ft./min.	710 ft./min.	1,300 ft./min.	1,250 ft./min.
Absolute ceiling	21,300 ft.	24,200 ft.	25,500 ft.	28,000 ft.
Cruising range...	2,650 miles	2,700 miles	1,500 miles	1,550 miles



This sketch of the roomy pilot's cockpit of the Vultee attack-bomber shows that, despite the profusion of "gadgets," an orderly layout has been attained.

Ten 120lb. bombs are carried under the centre wing panel in two groups of five, one behind the other, the forward group being located so that the tails of the projectiles clear the internal bombs. The centre shackle provided for this group is mounted forward of the other four, so that when a 1,100lb. is carried its tail has a ground clearance of not less than 10in. On the outer shackles 285lb. or 625lb. bombs may be carried.

Either a Wright Cyclone SR-1820-F52 (820 h.p. for take-off and 775 h.p. at 5,800ft.) or a Cyclone F-53 (750 h.p. at 11,000ft.) is fitted. The aircrew is a Hamilton Standard C.P. type with a 10 deg. pitch range.

ROYAL AERO CLUB OFFICIAL NOTICES

A MEETING of the committee was held at 119, Piccadilly, London, W.1, on Wednesday, October 23, at which the following were present:—Lord Gorell, C.B.E., M.C. (in the chair), A. J. A. Wallace Barr, Flt. Lt. C. Clarkson, Lt. Col. M. O. Darby, O.B.E., Major C. J. W. Darwin, D.S.O., W. Lindsay Everard, M.P., Major A. Goodfellow, Capt. A. G. Lamplugh, John Lord, Major R. H. Mayo, O.B.E., Lt. Col. Sir Francis K. McClean, A.F.C., Lt. Col. M. O'Gorman, C.B., G. H. Wilson Fox.

The following new members were elected:—G. R. Armstrong, F. E. Buckell, A. F. Burke, W. A. H. B. Burnside, V. L. Gruberg, W. T. S. Lewis, G. Nicholson, R. S. Ollington, C. M. Poulsen, G. L. G. Richmond, E. Scott, D. L. Townsend, J. O. Waddington, G. H. Walker, G. S. M. White, C. T. Williams.

The following Aviators' Certificates were granted:—Nos. 13216 to 13308. The following Gliding Certificates were granted:—"A" Certificates, 8; "B" Certificates, 5; "C" Certificates, 6.

Reports from the House, Finance and Racing Committees were received.

Lt. Col. M. O'Gorman presented his report on the Conference of the F.A.I. at Dubrovnik (September 6-12), which he attended on behalf of the Club. The report included the following items: Classification of light aeroplanes; methods for measuring altitudes above 10,000 metres; speed records at high altitudes.

Classification of Light Aeroplane Records.—The Federation Aéronautique Internationale has decided that from January 1, 1937, new records for light aeroplanes will be established in categories fixed according to the cylinder capacity of the

engine or engines in the aircraft. These will be as follows:—Category 1, maximum cylinder capacity, 9 litres; category 2, 6½ litres; category 3, 4 litres; category 4, 2 litres.

Each category will include records for single and multi-seater aircraft.

In the case of seaplanes and amphibians only categories 1 and 2 will apply.

Mersa Matrouh Aerodrome.—The Egyptian Government has informed the Royal Aero Club that the Civil Airport of Mersa Matrouh has been temporarily closed down to aircraft.

Aircraft traversing the Western desert during their transit flights through Egyptian territory are hereby notified that no facilities of any nature can be accorded at Mersa Matrouh.

Pilots and aircraft owners are notified that all aircraft, whether proceeding into or out of Egyptian territory from the Western boundaries, are obliged to land at Salloum Aerodrome (El Sollum), where customs, passports and other formalities can be effected.

October 25, 1935.

HAROLD E. PERRIN, Secretary.

New Marconi Radio Establishment

THE development which has taken place in its aircraft radio business has made it necessary for the Marconi Company to create a new organisation, known as the Marconi Aircraft Wireless Establishment, in which will be centred all activities concerning the development, design, and manufacture of all kinds of aircraft radio apparatus.

This establishment has just been opened at premises which have been secured in Wandle Road, Hackbridge, Surrey.

The new works will provide employment in the Croydon area for instrument makers, draughtsmen, and technical staff.

THE ROYAL AIR FORCE

SERVICE NOTES AND NEWS

AIR MINISTRY ANNOUNCEMENTS



FORMATION OF NEW SQUADRON

No. 215 (Bomber) Squadron formed at Worthy Down on October 7, instead of at Upper Heyford as was previously stated would be the case.

SINGAPORE AUXILIARY AIR FORCE

A Bill was to come before the Legislative Council of Singapore last Monday to authorise the formation of an Auxiliary Air Force in the Colony. Volunteer Corps exist in most Colonies and Dependencies as auxiliary forces of the Army, but this will be the first Auxiliary Air Force to be formed outside the United Kingdom. Presumably the officers' commissions will be granted by the local Governor.

MOVES OF BOMBER SQUADRONS

It was announced in *Flight* of September 19 that No. 18 (Bomber) Squadron would move from Upper Heyford to Bircham Newton, and No. 58 (B) Squadron from Worthy Down to Upper Heyford. These moves have now been cancelled.

NOMENCLATURE OF AERO ENGINE—CHEETAH IX

Another engine, manufactured by Armstrong Siddeley, Ltd., is being introduced into the service. It is of the air-cooled radial, seven cylinder, single-row type, moderately supercharged, and is intended for use with fuel of 87 octane value. The official name is Cheetah IX. The rating and other particulars are as follows:—

B.H.P. 295/310—at 6,000 ft. at 2,100 r.p.m.

Compression ratio—6.35:1.

Bore 5.25 in. Stroke 5.5 in. direct drive.

R.A.F. BENEVOLENT FUND

The usual meeting of the Grants Committee of the above fund was held at Iddesleigh House on October 22. Air Comdr. B. C. H. Drew, C.M.G., C.B.E., was in the chair, and the other members of the Committee present were: Mrs. L. M. K. Pratt Barlow, O.B.E., and Sqn. Ldr. C. E. H. James, M.C. The Committee made grants to the amount of £499 10s. 2d. The next meeting was fixed for November 5.

FLYING ACCIDENTS

The Air Ministry regrets to announce that No. 564110 A./Sergt. Edwin Aubrey Brett, of No. 9 (Bomber) Squadron, lost his life in an aircraft accident which occurred at Andover on October 21. Sergt. Brett was the pilot and sole occupant of the aircraft. Also that Flight Cadet Robert Harold Winter, of the Royal Air Force College, Cranwell, lost his life in an aircraft accident which occurred at Cranwell on October 22. Flight Cadet Winter was the pilot and sole occupant of the aircraft.

ROYAL AIR FORCE GAZETTE

London Gazette, October 24, 1935

General Duties Branch

H. H. Peck is granted a permanent commission as Pilot Officer with effect from October 9, and with seniority of July 9, 1934.

The following are granted short service commissions as Acting Pilot Officers on probation with effect from and with seniority of October 7:—G. B. Andrews, J. L. Atkinson, J. Barrett, D. R. Biggs, N. M. Boffee, P. T. Bozman, J. B. Burnett, L. R. Field, J. Foulsham, P. A. Gilchrist, H. D. Green, G. F. Hall, P. P. Hanks, P. J. H. Harrington, F. Harrison, P. W. Hartley, G. L. B. Hull, T. M. Hunt, E. G. Jones, C. E. Levitt, R. D. More, B. G. D. Nathan, F. J. Norris, W. M. Penman, C. L. C. Roberts, P. F. Rutter, J. H. Sindall, W. O. L. Smith, P. G. D. Taylor, R. N. Todd-White, D. G. Warren, A. E. Williamson, D. B. M. Wright, R. P. S. Wyrill.

The following Flying Officers are promoted to the rank of Flight Lieutenant:—A. H. Seymour-Lucas (September 26); I. C. Bird (September 30); L. M. Hooper (October 3).

The following Pilot Officers are promoted to the rank of Flying Officer:—J. S. Leslie (July 9); J. B. P. Thomas (September 3); P. H. Dutton, C. R. Taylor, H. West (September 24).

Medical Branch

R. A. Cumming, M.B., Ch.B., is granted a short service commission as a Flying Officer for three years on the active list with effect

No. 48 (G.R.) SQUADRON

On November 25 next No. 48 (G.R.) Squadron will commence to form at Bicester. It will be the first of the new class of General Reconnaissance squadrons, and will be equipped with the Avro Anson, which has been developed from the Avro 652 commercial aeroplane. It has a retractable undercarriage and, driven by two Cheetah IX engines, it will have a top speed of over 190 m.p.h. Seven G.R. squadrons are to be formed, and while the designation implies that they may be used for various forms of reconnaissance, the intention is that they will specially undertake coast patrol and defence of the type hitherto undertaken by the slower flying boat. The Empire will, however, still need flying boat squadrons.

R.A.F. MEDICAL AND DENTAL SERVICES DINNER

The fourteenth annual dinner of the Royal Air Force Medical and Dental Services will be held at the Royal Air Force Club at 7.30 p.m. for 8 p.m. on Friday, November 29. Tickets, 10s. 6d. each, exclusive of wines, may be obtained from the Honorary Secretary, Sqn. Ldr. F. L. White, Directorate of Medical Services, Air Ministry, 5/6, Clement's Inn, London, W.C.2.

FITTER, GRADE I, CONVERSION COURSE

The Fitter, Grade I, Conversion Course will move from Halton to Henlow. The move will commence on December 2, 1935, and is to be completed by January 4, 1936.

CIVILIAN CLERKS AT OUTSTATIONS

When a unit moves from one station to another it will be necessary to restrict the number of civilian clerks who will transfer with the unit. As soon as possible therefore after a move has been notified, the C.O. should obtain a written statement from each civilian clerk indicating, in order of preference, whether he wishes—(i) to move with the unit; (ii) to be considered in connection with vacancies at other units; or, if applicable, (iii) to be re-employed at his existing station with an incoming unit. These statements should be forwarded direct to the Air Ministry, together with a list of all the civilian clerks employed at the unit, showing the duties on which each clerk is employed, and, in the case of temporary clerks, the dates of their engagement, and whether they are ex-airmen and are filling civilian posts on the authorised establishment. The C.O. should also submit his recommendations as to the clerks who should move with the unit.

A temporary clerk who elects not to move with his unit and is not required to do so, and who cannot be re-employed at his old station owing to the absence of a vacancy, will not prejudice his chance of further employment provided he is willing to bear the expense incurred in taking up duty at another station where a vacancy exists.

from October 1, and with seniority of October 1, 1934. The short service commission of F/O. S. R. C. Nelson, M.D., is antedated to August 29, 1934.

Memoranda

The permission is granted to Sec. Lt. R. W. J. Thorogood to retain his rank is withdrawn on his enlistment into the ranks of the Supplementary Reserve (September 4). The permission granted to Sqn. Ldr. T. S. Impey to retain his rank is withdrawn on his conviction by the civil power (September 10).

PRINCESS MARY'S ROYAL AIR FORCE NURSING SERVICE

The following promotions are made with effect from the dates stated:—

Senior Sisters, Acting Matrons, to be Matrons (August 1):—Miss G. Taylor, Miss J. D. Jackson.

Sisters, Acting Senior Sisters, to be Senior Sisters (August 1):—Miss C. Walker, A.R.R.C., Miss M. E. R. Edwards, Miss G. E. M. Clubb.

Sisters to be Senior Sisters (October 1):—Miss L. E. Taylor, Miss E. M. Clements, Miss M. S. F. Stewart, Miss M. McGlynn, Miss M. J. Macdonald, A.R.R.C., Miss M. A. Macvicar, Miss E. Spensley, A.R.R.C., Miss M. E. Ball.

The following Staff Nurses are promoted to the rank of Sister (August 1):—Miss A. M. Tisdall, Miss E. Happer, Miss H. N. B. Grierson, Miss M. H. Duff, Miss E. M. Bromley, Miss V. M. Forcer-Williams, Miss I. F. Clark, Miss M. B. Weir, Miss M. Laverack, Miss N. R. Lake, Miss D. E. Harvey, Miss W. M. E. Marshall, Miss M. N. Creasy, Miss E. M. Grunnah, Miss R. F. Beech, Miss M. Jopp.

ROYAL AIR FORCE RESERVE

Reserve of Air Force Officers General Duties Branch

E. Bradley is granted a commission as Flying Officer in Class C (October 8); S. W. Rowland is granted a commission as Pilot Officer in Class C (October 7); Pilot Officer on probation J. O. Hedley is confirmed in rank (August 16); F/O. J. C. Ticehurst is transferred from Class AA(ii) to Class C (October 17); F/O. W. A. Ram-

say relinquishes his commission on completion of service and is permitted to retain his rank (August 13).

The following Pilot Officers relinquish their commissions on appointment to short service commissions in the Royal Air Force (October 7):—G. F. Hall, P. J. H. Harrington, J. H. Sindall.

SPECIAL RESERVE

General Duties Branch

R. H. Smith is granted a commission as Pilot Officer on probation (September 14).

AUXILIARY AIR FORCE

General Duties Branch

No. 600 (CITY OF LONDON) (FIGHTER) SQUADRON.—The following Pilot Officers are promoted to the rank of Flying Officer:—R. P. Braun (October 19); R. G. Kellett (October 20).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Squadron Leader.—C. W. Hill, to No. 35 (B) Squadron, Bircham Newton, to command vice Sqn. Ldr. A. P. Ritchie, A.F.C., 22.9.35.

Flight Lieutenants.—J. M. Cohu, to No. 2 (Indian Wing) Station, Kohat, India, 14.9.35. P. L. P. Marett, to No. 1 (Indian Wing) Station, Risalpur, India, 16.9.35. B. D. Nicholas, to R.A.F. Station, Eastleigh, 1.10.35. E. B. Webb, to Superintendent of R.A.F. Reserve, Hendon, 14.10.35. F. D. Biggs, to No. 9 (B) Squadron, Boscombe Down, 14.10.35. R. L. Mills, to No. 811 (F.T.B.) Squadron, 8.10.35. B. G. Farrow, to No. 12 (B) Squadron, Andover, 21.9.35. E. G. H. Russell-Stracey, to No. 12 (B) Squadron, Andover, 22.9.35. A. E. Taylor, to No. 142 (B) Squadron, Andover, 24.9.35. F. J. Taylor, to No. 12 (B) Squadron, Andover, 21.9.35. H. J. Walker, to No. 142 (B) Squadron, Andover, 21.9.35. G. F. Whistondale, to No. 207 (B) Squadron, Bircham Newton, 22.9.35. A. W. Hunt, to No. 23 Group Headquarters, Grantham, 14.10.35. R. J. O. Bartlett, to No. 3 (F.) Squadron, Kenley, 23.9.35. G. H. Loughnan, to No. 3 (F.) Squadron, Kenley, 23.9.35. G. B. M. Rhind, to No. 3 (F.) Squadron, Kenley, 22.9.35. H. M. Whittle, to No. 29 (F.) Squadron, North Weald, 22.9.35. C. K. J. Coggle, to No. 33 (B.) Squadron, Upper Heyford, 24.9.35. J. W. Colquhoun, to No. 33 (B.) Squadron, Upper Heyford, 23.9.35. A. H. Montgomery, M.B.E., to No. 41 (F.) Squadron, Northolt, 22.9.35. C. H. A. Stevens, to No. 41 (F.) Squadron, Northolt, 22.9.35.

Flying Officers.—A. L. Christian, to No. 207 (B) Squadron, Bircham Newton, 22.9.35. E. A. Douglas-Jones, to No. 35 (B) Squadron, Bircham Newton, 22.9.35. H. N. G. Ramsbottom-Isherwood, to No. 35 (B) Squadron, Bircham Newton, 22.9.35. R. C. Gaskell, to Headquarters, Coastal Area, Lee-on-the-Solent, 12.9.35. M. A. Payn, to No. 1 Armament Training Camp, Catfoss, 18.10.35.

Pilot Officers.—R. G. R. Buckley, to No. 9 (B) Squadron, Boscombe Down, 12.10.35. D. E. Cattell, to No. 207 (B) Squadron,

Bircham Newton, 20.9.35. R. E. Curry, to No. 12 (B) Squadron, Andover, 27.9.35. H. L. Dawson, to No. 142 (B) Squadron, Andover, 27.9.35. F. F. Essam, to No. 35 (B) Squadron, Bircham Newton, 22.9.35. R. G. Yaxley, to No. 35 (B) Squadron, Bircham Newton, 27.9.35.

Acting Pilot Officers.—J. Fulton, C. R. Hart, E. G. Campbell-Voullaire, to No. 9 (B) Squadron, Boscombe Down, 12.10.35. W. E. Casley, K. C. Gill, H. J. Irens, J. E. Pelly Fry, J. A. Tinne, C. A. Wood, to No. 58 (B) Squadron, Worthy Down, 12.10.35.

Stores Branch

Flight Lieutenant.—J. T. Riggs, to No. 33 (B) Squadron, Upper Heyford, 24.9.35.

Flying Officer.—H. W. C. Springham, to No. 142 (B) Squadron, Andover, 22.9.35.

Pilot Officer.—L. C. Dennis, to No. 29 (F) Squadron, North Weald, 22.9.35.

Accountant Branch

Flight Lieutenants.—L. Chegwidan, to No. 84 (B) Squadron, Shaibah, Iraq, 26.9.35. R. D. Pratt, to Aircraft Depot, Hinaidi, Iraq, 26.9.35.

Accountant Branch

Flying Officers.—E. A. Biddle, to No. 35 (B) Squadron, Bircham Newton, 19.9.35. T. E. Horsfield, to No. 12 (B) Squadron, Andover, 21.9.35.

Flying Officer.—G. L. Seabrook, to No. 29 (F) Squadron, North Weald, 22.9.35.

Medical Branch

Squadron Leaders.—H. McW. Daniel, to No. 3 Flying Training School, Grantham; for duty as Medical Officer, 17.10.35. E. N. H. Gray, to No. 5 Flying Training School, Sealand; for duty as Medical Officer, 17.10.35.

AIR-RAID PRECAUTIONS

WING-COMMANDER E. J. HODSOLL, C.B., the Home Office official in charge of preparations for protecting the civil population against the effects of air attack, is a very energetic person. Every day he seems to address some public body or other, and on Wednesday of last week he read a paper on the subject before the Royal United Services Institution, with the Marquess of Londonderry in the chair.

The lecturer straight away raised everybody's spirits by remarking optimistically that though people had not thought very much about this subject so far, he hoped that they would all think more about it in the future, because it was very important. Some of the audience inwardly hoped that their attention would not be drawn to it too forcibly.

To depart from the due order of the lecture, the most striking remarks made by Wing Cdr. Hodsoll were to the effect that there was a tendency to exaggerate the danger of gas bombs, and that, in his opinion, the greatest danger was from fire. He could give the opinion of expert chemists that there was very little probability of some new form of gas being discovered which would go through our respirators. Our chemists knew the possible sorts of gases which could be used, and we could produce respirators which would protect the lungs from all of them. Moreover the effects of gas were very local. The idea that one bomb would start a cloud of gas which would sweep all over London was not correct. Fires from incendiary bombs would be, he thought, a much greater danger, partly because the fire brigades all over the country were not all so efficient as the London Fire Brigade.

Great anxiety has been expressed about procuring gas masks. The Government, said the lecturer, had been developing a mask, and it had nearly reached the production stage, which would not cost more, he hoped, than a florin, and which would give immunity from all gases for about a quarter of

an hour. That would enable a person to get out of a gassed area, though it would not prevent his clothes from being splashed with mustard gas, and other steps would be necessary to test his clothes and, if they were splashed, to decontaminate them.

The lecturer described the principles of the plan of campaign. The main responsibility must rest with the central Government, but they must rely on the co-operation of everyone concerned. Now, few parts of the country were out of reach of raiding aircraft, and it would not be possible to provide complete protection for every spot. They must keep reserves to rush up to a threatened point. The policy was to take existing organisations and use them. The Government was accumulating masks, special clothing, etc., and would issue them to essential services such as the police. But localities were asked to think out their own special problems. People responsible for supplying water and lighting were being asked what measures they proposed in case a large power station or other important point were hit by a big bomb. For instance, if water supplies were destroyed it might be possible to fall back on wells.

Decontamination from mustard gas must be divided into the two heads of personnel and material. The former would be treated together with other casualties, probably at hospitals. The latter would be handed over to the sanitary services. Personal clothing would be decontaminated by laundries, and there would have to be supplies of clothing to issue to people while their own was being treated.

The lecturer said that every householder must be responsible for his dependents. It was best to go into a gas-proof room and stay there, and everybody with a good house could proof a room against gas for a few pence. The Government would have to consider the problem of poor people whose dwellings did not make this possible.

AERONAUTICAL PROBLEMS OF TO-DAY

American, British and German Technicians Gather in Berlin : Monocoque Construction, Cruising at Altitude and Other Topical Subjects Discussed

MANY of the problems connected with modern aeronautical research were discussed at the joint meeting of the D.V.L. (Deutsche Versuchsanstalt für Luftfahrt) and V.L.F. (Vereinigung für Luftfahrtforschung), held in Berlin on October 11 and 12. Papers were read by prominent German, English, and American scientists and technicians, and the bringing together of so many representatives of aeronautical research from many different countries cannot but have a beneficial effect on research all over the world. Space does not, unfortunately, permit of dealing in detail with the many papers presented at the meeting, but the following summaries will, at any rate, serve to show the nature of the problems with which the technicians in these three countries are grappling.

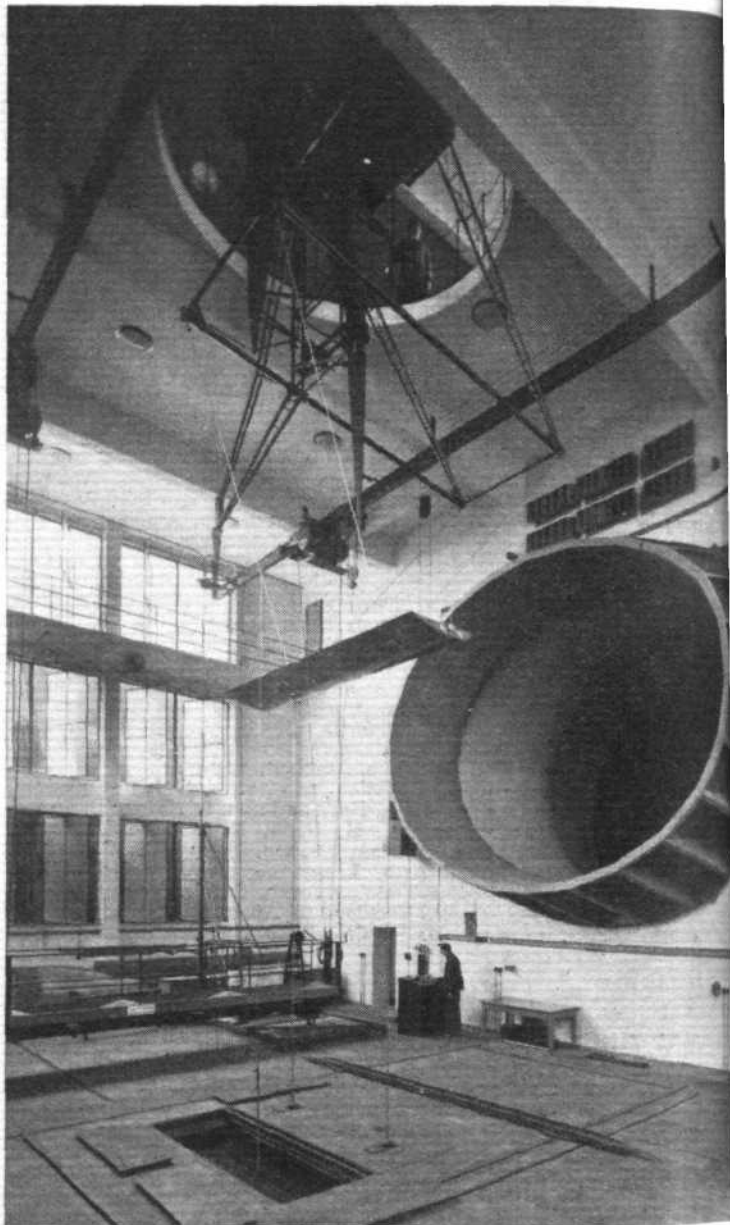
For the benefit of readers who are not familiar with the organisation of German research, it may be explained that the Deutsche Versuchsanstalt für Luftfahrt, usually referred to as the D.V.L., corresponds approximately to our R.A.E. at Farnborough, and to certain sections and departments of the National Physical Laboratory at Teddington.

The Vereinigung für Luftfahrtforschung (V.L.F.) was established in 1933. Its activities include all aeronautical research and experimental work in Germany. The V.L.F. consists of an advisory board, branch committees and sub-committees for solving specific problems. The V.L.F. institutes research, investigation and study of aeronautical problems; it controls and improves the exchange of experiences between the research centres and the scientists, and links these institutions with the aircraft manufacturers, transport companies and the military air organisations of the government.

The V.L.F. has no permanent members. The council, the clerical staff and the chairmen of the boards and committees are the only permanent elements of the organisation. All other scientific and technical experts are invited from time to time to collaborate on subjects that belong to their particular sphere of activity.

The meeting was opened on Friday, October 11, with a speech of welcome by Ministerialrat A. Baeumker, Departmental Chief of the German air ministry. Herr Baeumker welcomed in particular those foreign guests who had, in spite of many difficulties, found time to make the long journey to Germany, such as Mr. Hibbard, of the Lockheed company, and Mr. Capon, of the Royal Aircraft Establishment, Farnborough.

Mr. Hall F. Hibbard, of the Lockheed Aircraft Company, Burbank, California, had chosen for his subject, "Developments and Trends in High-speed Aircraft." He pointed out that hitherto it had been sufficient, in the aerodynamic design of fast commercial aircraft, to suppress as far as possible structural members which projected into the air stream, but



Inside the large wind tunnel of the D.V.L. Of the closed-circuit type, this tunnel has aerofoil-shaped deflectors in the right-angle bends, somewhat after the style of those in the large wind tunnel at Farnborough.



Not a vertical wind tunnel, but the special silencers of the D.V.L.—the German Farnborough—engine test house.

that in modern times, when this had been done, designers began to make use of the latest refinements and to design for specific conditions. Instead of designing for maximum speed, one now designed for cruising speed over short, medium and long distances. For a given flight stage there was a corresponding altitude at which the most efficient cruising speed was attained.

Improvements were still possible by a better shape of fuselage, wings and tail. By increasing the aspect ratio from 5.5 to 8 it was possible to increase by 5 m.p.h. the cruising speed of an aeroplane designed to cruise at 62.5 per cent. power at 13,000-14,000 ft. An increase in wing loading was less effective in aircraft designed to fly throttled. Thus above a wing loading of about 30 lb. per sq. ft. the cruising speed was not increased by a further reduction of wing area.

Stability of fast commercial aircraft could be improved by suitable forming of fuselage, wings and tail. Twin rudders (as on the Lockheed Electra) afforded ample stability over a c.g. position range from 18.4 per cent. to 33.7 per cent., and

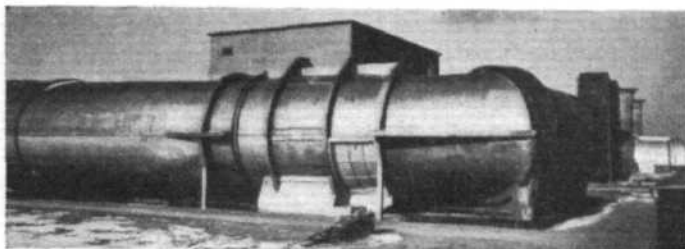
so light were the controls that aerodynamic balances were unnecessary.

The increase in the speed of commercial aircraft demanded a corresponding increase in the strength and stiffness of structural members. In America the development had been in the direction of all-metal construction with stressed skin stiffened by internal formers. Riveting was used at present for joining, and countersinking of rivets on the outside gave a smooth finish. In the future, shot welding might become the accepted method.

Professor Dr. Ing. H. Wagner, of the Berlin Technical High School, dealt with the problems of strength in "shell" or *monocoque* construction. The real difficulty was the transmission, by sheet metal less than 1 mm. thick, of forces in the shell. The lecturer dealt with subjects such as the form of stiffeners employed, methods of ensuring that loads were transmitted past cut-outs such as cockpits, and the distribution of loads around the attachments of wings to fuselage. Many problems still remained to be solved if such shells were to be as light and simple as possible.

Construction of and experimental experience with "shell" fuselages was also dealt with by Dr. Ing. H. Hertel, of the Heinkel Aircraft Works. He pointed out that fuselage "shell" construction had two advantages. One was the good aerodynamic form and the other a saving in weight. In the old-fashioned braced girder fuselage, only about 60 per cent. of the weight was accounted for by the primary structure. In the *monocoque* type of construction, the skin contributed a large share. Yet another advantage of "shell" construction was that the stress-resisting part of the structure lay immediately under the skin, so that for a given outside cross-section, the internal space was a maximum. At first they had difficulty in getting stresses transmitted around cut-outs such as cockpit opening, windows, etc., but suitable framing had made this possible. To evolve such framing, however, severely taxed both the designer and the constructor.

At first, the number of man-hours necessary to build a



An external view of the large D.V.L. wind tunnel. The tunnel itself is a large tube of concrete.

"shell" fuselage was greater than that for the girder type, but as experience increased it was found possible to reduce the number of man-hours to a point where the advantages of the "shell" construction made it worth while.

During the evolution of methods of stress calculation for "shell" structures, experimental tests had to be made on models and complete parts in order to provide a check on the calculations, and to provide data for such parts of a fuselage as could not be calculated.

During the lecture Dr. Hertel showed lantern slides of typical "shell" forms of construction, stiffeners and so forth, and he outlined the directions in which improvement was still possible.

Mr. R. S. Capon, of the R.A.E., outlined some problems in aero engine research. He pointed out that since 1923 piston speeds and B.M.E.P. had been doubled, with the result that specific weight had come down to about 1 lb./h.p. Anti-detonating fuels had made this possible, and it was to be expected that with fuels of still higher Octane numbers, say, of 100, further improvements in weight and consumption could be attained. The improvements made had been the result not of revolutionary innovations, but of detail improvements. Direct fuel injection had yet to prove itself capable of the good results expected of it. The two-stroke had not made much progress, largely because of the difficulty of cooling. When it was designed to operate at one-half the speed of the corresponding four-stroke, the difficulty of getting rid of the heat might be overcome. Interest in the Diesel had decreased; it came into consideration for long-distance flights only.

Automatic mixture control had proved itself, and had resulted in uniform consumption figures being obtained. Cooling had been improved; steam cooling had been a success, and for air-cooled engines cowlings with flaps for controlling the cooling had been evolved.

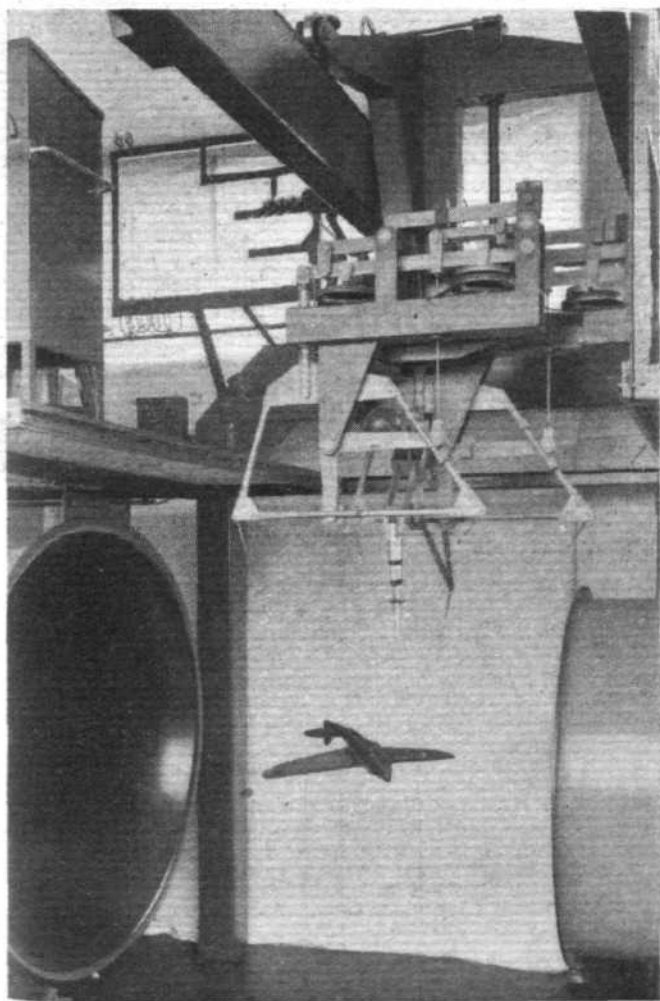
The output of blowers could probably not be greatly increased without the use of inter-stage cooling. New heat-resisting materials appeared to give promise of further progress with exhaust-driven superchargers. In conclusion, he thought the future belonged to the classic aero engine which, in the form of a four-stroke petrol engine, had proved so efficient and reliable that it was doubtful if any fundamentally new type of engine could supplant it.

Medical Aspects

Professor Dr. H. Rein spoke of the medical aspects of flying, and said that the two great problems which science had to solve related to high-altitude flying and to the effects of high accelerations during the manoeuvring of modern high-performance aircraft.

"Optimum Cruising Altitudes" was the subject chosen by Mr. E. T. Allen, of Eastern Air-Lines, Inc., New York. He outlined the work done in the United States, and explained how tests and experiments with the Northrop Delta at various engine outputs had enabled them to prepare speed/altitude charts for use by the pilots, so that they could choose the most economical cruising height for the particular route.

The last paper of the meeting was by Dr. Ing. W. Runge, of the Telefunken Wireless Company. After outlining the limitations of wireless generally, Dr. Runge called attention to the rôle which short-wave radio was likely to play in air navigation. He referred also to the fact, hitherto almost disregarded, that radio waves were reflected from solid bodies. This fact, in conjunction with the almost constant speed of radio waves, afforded a possibility of using them for measuring the distance from a transmitting station to a solid body by timing the interval between the sending of a signal and the time of receiving its echo. For the most exact measurements the very short waves were particularly suitable. Fundamentally there should be possibilities of measuring in this way the altitude of an aircraft above the ground in much the same way as the echo sounding device enabled the depth to be measured at sea.



This view of the D.V.L. small wind tunnel shows a model suspended from the overhead balance.

THE "86" for '36

Two Improved Versions of the Famous D.H. Express, One with New Engines and Controllable-pitch Airscrews : Strengthened Structure

ENCOURAGED by the success of the D.H.86 (or Express) four-engined transport machine since it was introduced in January last year, the De Havilland Company has decided to market two new and improved models, to be known as the type 86A, during 1936. One will continue to be fitted with standard Gipsy Six engines driving ordinary fixed-pitch airscrews, but a second model will be available having higher-powered Gipsy Sixes, known as the Series II, and De Havilland controllable-pitch airscrews.

The former model, which, of course, is the lower priced, is intended for operation on short routes where the first cost of equipment is of more importance than the highest obtainable performance.

So far as the airframes are concerned the two types are identical. Structural improvements have been introduced which permit the carriage of a greater payload than in the original "86" employing standard Gipsy Six engines. The superstructure is stronger and more rigid, and the drag tubes and wing bracing wires and spars have also been strengthened in view of the greater load to be carried. A new undercarriage is used, incorporating pneumatic compression legs, reinforced tyres, and larger and more powerful brakes.

An improved tail wheel unit incorporating one of the new Dunlop Ecta tyres in a fork-type mounting is also included as standard equipment.

The engine cowling has been redesigned to reduce drag, to permit greater accessibility to the power plants and to facilitate maintenance.

In the "Office"

Dual control is included as standard equipment. The pilots' seats have been improved, while the cockpit windows and windscreens have been modified to reduce the entry of wind and rain when open, and to improve visibility during bad weather. Indirect lighting is provided for the instrument panel, and the general lighting of the cockpit has been carried out on more scientific principles.

In order to provide a higher degree of lateral stability at low speeds and increased lift under take-off conditions the wing-tip profile has been altered.

Soundproofing has received greater attention than in the old model, and ventilation control has been developed to a higher degree. The cabin heating system is now instantly adjustable to suit passengers' taste. The flow of cold air can be controlled from each seat, and it is impossible for the cabin to become stuffy, since the air is being constantly and automatically changed.

A rudder servo-flap, in conjunction with the adjustable fin, should entirely counteract the effect of uneven thrust occasioned by one or two engines being rendered inoperative, and enable the machines to be flown with full load in this condition without undue muscular effort on the part of the pilot. This

servo-flap is operated by the fin trimming gear, and not by the rudder.

More direct and effective measures have been taken to protect the machine from the effects of moisture and corrosion, not only on exposed parts, but throughout the structure.

One of the two new types is fitted with series II Gipsy Six engines rated to give a higher continuous power output than the standard type, and equipped for the operation of the controllable-pitch airscrews. The new engine has a compression ratio of 6 : 1, compared with the standard ratio of 5.25 : 1. Fuel of a higher octane rating will, of course, be necessary, and the cylinder heads of the Series II engine are of a new aluminium type which will permit the use of leaded fuel. This should be an advantage to operators in areas where a fuel in high octane number can be obtained most economically by the addition of tetra ethyl lead.

In order to remove the drag of external venturis, a vacuum pump is being incorporated in the new engines to drive the gyros of the blind-flying instruments. In addition, the new unit can, if required, be equipped with an oil servo pump to provide the necessary driving power for an automatic pilot; provision has actually been made in the machine for the installation of the P.B. type.

D.H.86A.

FOUR-ENGINED TRANSPORT BIPLANES.

Four Gipsy Sixes or Four Series II Gipsy Sixes.

	With Standard Gipsy Six engines.	With Series II Gipsy Six engines with C.P. airscrews.
WEIGHTS.		
Tare weight (excluding cabin equipment, but including electrical equipment)	6,140 lb.*	6,400 lb.
Disposable load	4,110 lb.	4,600 lb.
Maximum permissible weight ...	10,250 lb.	11,000 lb.
PERFORMANCE.		
Top speed at 1,000 ft.	170 m.p.h.	—
Cruising speed	140-145 m.p.h.	—
Operating speed at 7,000 ft. ...	—	155-160 m.p.h.
Height attained 656 yd. from rest ...	95 ft.	110 ft.
Climb to 5,000 ft.	6.5 min.	6 min.
Climb to 10,000 ft.	15 min.	14 min.
Absolute ceiling (approx.)	18,500 ft.	19,000 ft.
Service ceiling (approx.)	16,500 ft.	17,100 ft.
Ceiling on three engines	13,000 ft.	13,500 ft.
Ceiling on two engines (one on each side)	4,000 ft.	4,500 ft.
Ceiling with two engines (both on one side)	2,000 ft.	2,500 ft.
Gliding angle (without flaps)	1 in 11	1 in 11
Gliding angle (with flaps)	1 in 8½	1 in 8½
Landing run (with brakes and flaps) ...	220 yd.	240 yd.
Range (with 114 gallons)	457 miles	—
Range (with 190 gallons)	704 miles	—
Range (with 190 gallons) at 7,000 ft. ...	—	748 miles

* With Schwartz-covered wooden airscrews; Fairey-Reed duralumin airscrews add 86 lb.

Forthcoming Events

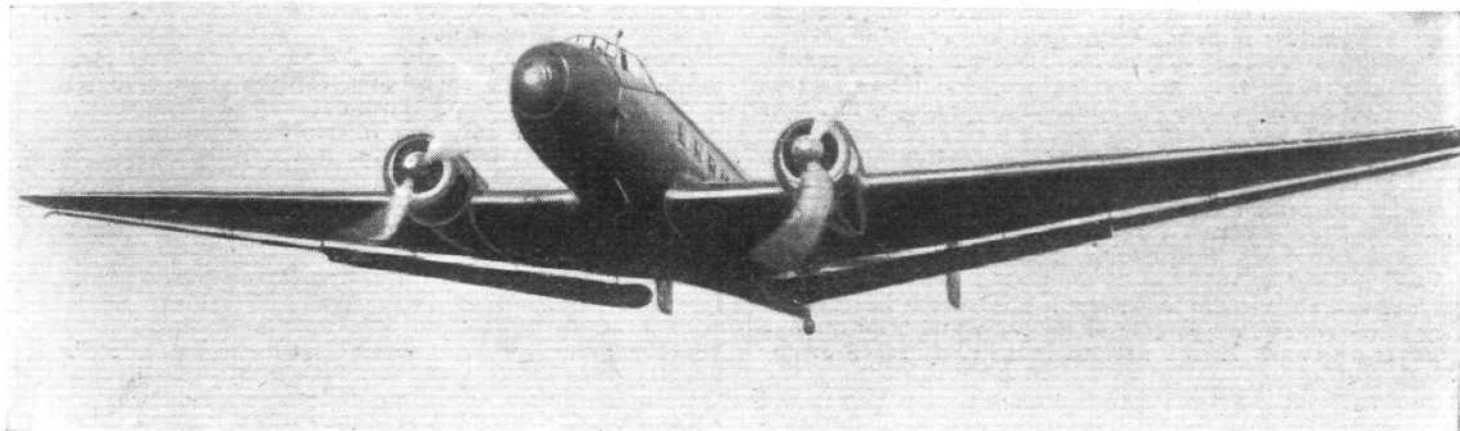
Club Secretaries and others are invited to send particulars of important fixtures for inclusion in the list.

- Nov. 1. Royal Air Force Flying Club. Jubilee Ball, Grosvenor House, London.
- Nov. 4. R.Ae.S. Lecture: "The Prevention of Ice Accretion," by B. Lockspeiser, 6 p.m., Institution of Electrical Engineers.
- Nov. 13. Royal United Service Institution Lecture: "Oil from Coal in War Time," by Col. W. A. Bristow, at 3 p.m.
- Nov. 14. British Empire League lecture, "The Air Defence of the Empire," by Air-Comdre. J. A. Chamier, 5 p.m., British Empire Club, St. James' Square, London.
- Nov. 18. R.Ae.S. Lecture: "Cooling Problems, with Particular Reference to the Work of the 24-ft. R.A.E. Tunnel," by Dr. G. P. Douglas, 6 p.m., Institution of Electrical Engineers.
- Nov. 29. Yorkshire Aeroplane Club. Annual Ball, Hotel Majestic, Harrogate.

- Dec. 2. R.Ae.S. Lecture: "Undercarriage Design," by G. H. Dowty, 6 p.m., Institution of Electrical Engineers.
- Dec. 6. Hampshire Aeroplane Club: Tenth Annual Dinner and Dance, South Western Hotel, Southampton.
- Dec. 16. R.Ae.S. Lecture: "Wireless and its Application to Commercial Aviation," by Capt. J. M. Furnival, 6 p.m., Institution of Electrical Engineers.
- Dec. 20. London Aeroplane Club. Annual Ball, Park Lane Hotel, London.
- 1936.
- Jan. 22. Royal United Service Institution Lecture: "The Expansion of the Royal Air Force," by Air Marshal Sir C. L. N. Newall, at 3 p.m.
- Mar. 10. Royal United Service Institution Lecture: "The Development of Civil Aviation," by Lt.-Col. F. C. Sheldermine, at 3 p.m.

COMMERCIAL AVIATION

— AIRLINES — AIRPORTS —



THE NEWEST JUNKERS: Well-tried Junkers features are retained in the Ju. 86, a ten-passenger twin-engined high-speed machine which will be put into service by D.L.H. next year. The stressed skin is, however, smooth in this machine, which has a maximum speed of 225 m.p.h.

THE WEEK AT CROYDON

The Return of the Altair : Flying Fitness : Fog Landings : The New Amsterdam Service : Duplication Difficulties : The Learned Profession

EVERYBODY was sorry when Sir Charles Kingsford Smith's flight failed early last week, but the commercial pilots of Croydon, who have not, as a rule, much use for record-breaking flights, commended "Smithy's" wisdom and courage in knowing when to turn back and in returning from Brindisi to Croydon (in one day) so as to start again in reasonable weather conditions.

I understand that Sir Charles will wait about a fortnight for a full moon, and in the meantime his aeroplane is once more in the capable hands of Rollason Aircraft Services. The leading edge and fin looked as if someone had been busy on them with a coarse rasp, and I have heard it whispered that British dope and fabric might have stood up better to the gruelling conditions. I hear that the weather which "Smithy" met was about the worst he had ever encountered.

Major H. G. Brackley's lecture on piloting commercial aircraft aroused considerable interest at Croydon, not unnaturally. The physical fitness of senior pilots was mentioned, and it certainly is remarkable how fit are the "million-mile" Imperial captains. Abstemiousness has much to do with it, and times appear to have changed since that other exponent of a profession where physical fitness and mental alertness are of vast importance, Mr. James Pigg, of Mr. Jorrocks' Hunt, used to live up to his motto, "Brandy and baccy'll gar a mon live for iver."

The retiring age of the air line pilot has never been settled, but now it looks as though he might continue to a ripe old age like many a physically and mentally sound ship's captain. This is just as well, because, exceptions apart, the air line pilot has to concentrate too exclusively on his job to become a good business man. After all, the average ship's captain does not enter a shipping office on the traffic side, on retirement.

Recently I was talking to a prominent Continental air line director on this subject. He said, "Train your own pilots from school days, pay them adequately, and give them a pension on which they can live when they retire." By "adequately" I gathered that he meant not too much at first, and more as they grew older in the company's service.

Talking of training, Surrey Flying Services has, during the past week, turned out four "A" licence pilots and one "B" licence pilot.

Now that the Lorenz system is to be installed at Heston, Croydon is all agog with rumours that the owners of the Airport will be doing something to assist pilots there. People

who know our landlords well suggest that a department is actively considering the erection, at some point extremely inconvenient for air traffic, of a replica of the Eddystone lighthouse.

British Continental Airways, whose co-operation on the Amsterdam line with K.L.M. was announced in *Flight* last week, has issued a provisional time-table for the service starting on November 1. Departure will be made from Croydon at 10.00 hrs., arriving Antwerp at 11.45 hrs., departing thence at 12.00 hrs., and arriving in Amsterdam at 12.45 hrs. In the opposite direction the machine will leave Amsterdam at 14.30 hrs., arriving Antwerp at 15.30 and Croydon at 16.45. This new service gives four daily links with Holland, even in winter, in each direction.

Once more we have been cheered up by a number of duplicated services. It is easy, sometimes, to obtain the traffic for extra machines in one direction, but impossible to fill them on the return journey. One day last week K.L.M. had a duplicated service inward to Croydon and managed to fill both machines to capacity for the return service to Holland.

Some years ago the regular air traveller used to hibernate in winter or travel by boat. Now you see all the season ticket holders all the year round.

Mr. S. L. Turner, of Wrightways, tells an interesting story of the efficiency of the P.B. automatic pilot which is fitted to one of the firm's Dragons. He practically let the robot land the machine, only taking over when three feet or so from the ground. He says that the approach was straighter and more accurate than with a human pilot.

A recent *Notice to Airmen* acquaints us with the fact that in *Notice to Airmen* No. 79/1935, p. 2, para. 19, note 1, line 8, we should delete QSY, CZE, and substitute QSW 322, QSY 325. After that, will any layman continue to assert that airmanship is not one of the learned professions? A. VIATOR.

Air Mail Increases

DURING the last quarter the weight of Empire letter mail showed an increase of 76 per cent. on that of the corresponding quarter of the previous year. It is estimated that 1,160,000 more letters were sent by air out of this country. During the first three months of 1935, incidentally, considerably more letters were carried than during the whole of 1934. Parcel mail dispatches increased by 8 per cent.

Commercial Aviation**FROM THE TRAFFIC MANAGER'S ANGLE**

*A Reply to the Article Dealing With Air Services from the Passenger's Point of View
Which Appeared in Last Week's Issue*

By a TRAFFIC MANAGER

AIR traffic companies do not expect a pat on the back for the immense improvements in passenger comfort and accommodation which they have made during the past few years. Rather do they expect a heavy blow betwixt the shoulders for not yet having achieved the impossible. Curiously enough, they welcome such critical blows as that which "C. R. H." dealt, good-humouredly enough, in *Flight* of October 24.

His remarks on the booking system are sound up to a point, but it must be remembered that the Government, not the air transport companies, owns the wireless system. If a passenger wishes to book a return passage within forty-eight hours it will be done by radio with no charge to the passenger. If the demand is for a booking outside forty-eight hours the authorities will not allow radio to be used. I wonder if he has ever tried to reserve accommodation on a Continental train through a booking agency? If so I warrant that he was asked to pay for the cable!

Over the bulky ticket business most traffic managers will agree with "C. R. H.," but, alas, we are all tied up to the International Air Traffic Association in this matter and we are compelled to use the bulky ticket he objects to. Incidentally, part of that bulk consists of a system whereby his registered baggage is practically safeguarded against loss.

His remark about the inconvenient shape of the ticket is interesting and strikes one as a helpful criticism. The companies obviously do not want passengers to lose their tickets, as they are all too apt to do. Perhaps someone will raise this point at the next I.A.T.A. conference.

Schedule Difficulties

It would be nice, of course, if aeroplanes could arrive at Croydon absolutely to schedule, and so they can if they have a sufficient reserve of power to meet a stiff head wind and still maintain their normal speed.

Most modern machines can do this with ease on mere local journeys of two or three hundred miles, and the majority of the arrivals which are seen slinking in late are long-distance connection machines which may have had to wait at some junction, such as Amsterdam, for machines bringing passengers from Prague, Vienna, Copenhagen, Malmö, Berlin, and so forth.

The remedy lies largely with "C. R. H." and his fellow air passengers. If they will only provide the companies with sufficient support, each long-distance line will become a unit in itself, and the Berlin passengers will not, for example, need to wait in Amsterdam for the Malmö connection, which is, perhaps, contending with a 40 m.p.h. head wind all the way.

The problem of air sickness really has been tackled in a

very practical way by the air companies, and that is by instructing pilots to seek an altitude, usually a high one, where bumps are scarcely felt at all. Incidentally, it would be easier to arrive dead on time at Croydon if the comfort of passengers was ignored and if pilots flew low in the horribly turbulent air near the surface so as to avoid the stronger but much steadier winds higher up. Then not only would the passengers complain bitterly, but their friends living on the air routes would write bitter letters to the Air Ministry complaining of low flying.

Everybody knows that the sixteen-seater machine with a window seat for each passenger is the ideal from the passenger's point of view.

When it comes to larger machines carrying more passengers, however, it cannot be done. Even the railway companies, with all their experience, have not yet invented a system whereby every passenger has a corner seat. These matters are easy game for the critic, and the air companies have racked their brains to find the best and most comfortable way of accommodating their passengers. Perhaps "C. R. H." will oblige with a practical solution. His suggestion about the individual supply of air to each passenger is good and should be universally adopted.

Every passenger on most of the air lines is given a brief pamphlet giving one or two useful hints, including advice about swallowing before descent. I know for a fact that the British and Dutch companies issue these pamphlets. Here, again, the trouble is with the passenger, who rarely troubles to read what is handed to him or to her.

Every company of any repute, by the way, has issued minute instructions to pilots to make the descent from high altitudes as gradual as possible. Cotton-wool has nothing to do with the unpleasant sensation in the ears which results from change of air pressure. An airport doctor told me recently that cotton-wool in the ears actually made matters worse. It is merely a sound-deadening substance and is quite unnecessary in many modern air liners.

The average traffic manager welcomes criticism from passengers and is always eager to find out what the traveller thinks of the travel provided. There is a definite tendency in most criticism from passengers to assume that the companies never trouble about these matters, although, for example, thousands of pounds and endless time and trouble have been spent on one item alone—that of developing an ideally comfortable chair.

For my part I am indeed grateful to "C. R. H." for this opportunity of pointing out how much has been done and is being done every day to make air transport the most comfortable form of travel.

Ambassadorial

LT. OWEN CATHCART-JONES is shortly to leave for South America on a lecturing and demonstration tour. For the latter work he is taking a Miles Hawk Trainer, but he will also look after the interests of the British aircraft industry as a whole.

An Envoy in Japan

THE Japan Air Transport Company has written to its associated company in this country to express its satisfaction with the performance of the Wolseley-engined Airspeed Envoy which has been in regular service in Manchukuo. Up to September 7 the total flying time amounted to more than 94 hours, and in that time no troubles of any kind had been experienced.

Among the Islands

SINCE the opening of the new aerodrome on Alderney several flights have been made to that island by Channel Island Airways' Saro Cloud used on the Jersey-Guernsey service. Jersey Airways, incidentally, is offering to pay 4 per cent. interest on any outlay by the Guernsey authorities up to £100,000 in return for a five-years monopoly of the commercial rights to the aerodrome when this is established.

Ex-Heston

THE second D.H.86, the sixth machine of the new Misr-Airwork Fleet, left Heston for Egypt on October 22 at 7.50 a.m. The machine is taking the Central European route, in common with all aircraft bound for Africa at the present time. Mr. A. E. Røgenhagen, a Misr-Airwork pilot, is in charge, with a crew of three. At Budapest it was due to take on board two directors of Misr-Airwork, H. E. Taher Pasha and Fouad Bey Sultan, with the latter's daughter and her governess.

Recently Air Commerce sent two Leopards through the murk to a burning oil tanker off Portland Bill. They reached the spot by creeping round the coast, and as they espied the ship, escorted by a destroyer, a submarine and a tug, the mist rolled away and the sun shone through and helped them to an excellent photograph. The same company last week despatched four people and their luggage in the Jubilee Monospar to Paris.

Balloons filled with hydrogen are now used at Heston to determine the height of low cloud. They are filled to a size which enables them to lift the weight of a special metal attachment. When this is removed they ascend at the rate of 400 feet per minute, and are timed with a stop-watch until they disappear into the clouds.

OPENING UP AFRICA

A Review of the Present and Future Air Services Operating Over the African Continent

ALTHOUGH it is possible that eventually there may be an alternative route to the Cape, planned either as a continuation of the Franco-Belgian trans-Saharan service or even as a separate coastal service with flying boats, Africa's only end-to-end service at present in action is that operated by Imperial Airways and run twice weekly.

According to present plans, this service will, by 1937, be operated entirely with flying boats up the Nile and down the east coast as far as Durban, where the work will be carried on by South African Airways with land machines. The present service, however, travels inland by Wadi Halfa, Khartoum, Juba, Entebbe, Nairobi, Mbeya, Broken Hill, Salisbury, Bulawayo, Johannesburg, Kimberley and Cape Town.

Thinking in terms of Africa as a whole, the next in importance is undoubtedly the weekly service operated by Sabena and Regie Air Afrique, between Europe and the Belgian Congo, via Oran, Colomb Bechar, Reggan, Bidon 5., Gao, Niamey, Zinder, Fort Lamy, Coquilhatville and Leopoldville or Brazzaville. Three-engined Fokkers are now used, and mails are almost exclusively carried. From Leopoldville Sabena's Congo service runs to Lusambo and Luluaburg, and it appears probable that this may eventually reach Broken Hill, whence the French Madagascan service carries mails to Antananarivo, linking up with the Imperial service. Next year the Saharan service will possibly proceed to Lisala, on the Upper Congo, which will be followed as far as the Katango, and Savoia-Marchetti machines, built under licence by Sabca at Haren, will be used for the trunk route.

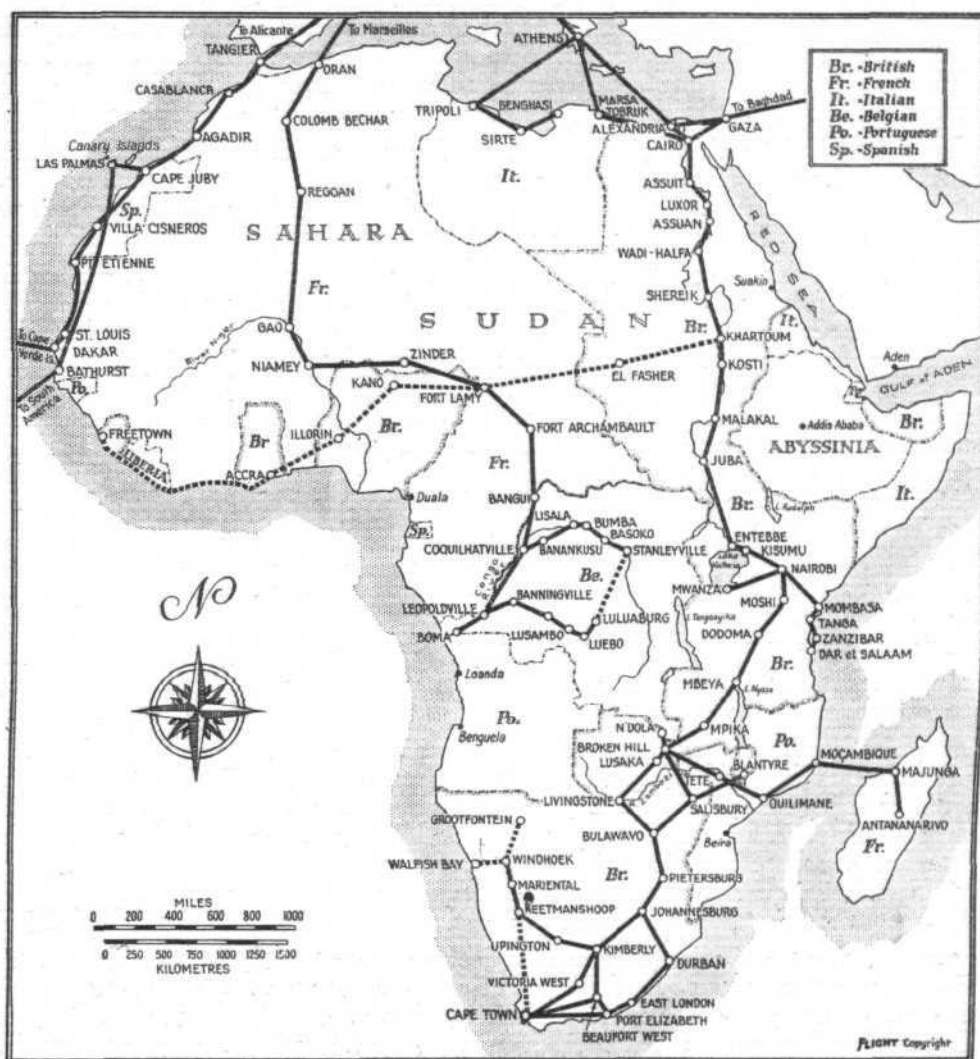
Another Congo service is that from Coquilhatville, via Lisala, to Stanleyville, and here again it is expected that this centre will eventually be connected with Luluaburg, so that the Congo circle will be completed.

Meanwhile, Imperial Airways have planned a trans-African service, which, with Elder Colonial Airways (a combination of Imperials and the Elder Dempster steamship interests) will connect Khartoum with Accra and Freetown on the west coast. The route will be by El Fasher, Fort Lamy, Kano and Illorin.

South African Airways—erstwhile Major Miller's Union Airways and now owning South-West African Airways—are very much part of the Empire scheme and are likely to be even more important in 1937. Four services are operated at present, between Johannesburg and Durban, Kimberley and Windhoek (weekly); Durban and Cape Town (bi-weekly); and Johannesburg and Cape Town. The company uses Junkers machines and now has four Ju.52s in service. Lines between Keetmanshoop and Cape Town, Windhoek and Walfish Bay and Windhoek and Grootfontein, in South-West Africa are projected.

Further north, Rhodesian and Nyasaland Airways, formed by a combine between Imperials, the Rhodesian Railways and the Beit Trustees in October, 1933, operated between N'Dola, Broken Hill, Lusaka, Livingstone and Bulawayo (weekly); between Salisbury and Bulawayo (weekly); and between Salisbury and Blantyre (bi-weekly). In East Africa, Wilson Airways fly every week from Nairobi to Zanzibar and Dar el Salaam and from Nairobi to Mwanza on Lake Victoria, while East African Airways run from Nairobi to Eldoret and Kisumu.

In Egypt, Misr Airwork, who are rapidly being re-equipped with a fleet of faster and larger machines (D.H.86s and 89s),



Africa's air routes as they appear to-day. The broken lines indicate services which are planned but which are not yet in operation.

run a daily service from Cairo to Alexandria and to Port Said, Lydda and Haifa with a weekly extension to Cyprus, as well as a summer service to Mersa Matruh on the coast. With the new fleet it appears probable that Misr Airwork will take an important part in the African system in the near future.

Meanwhile, Italian trans-Saharan plans are being developed, and it is reported that a very large number of military machines were recently flown from Tripoli to Eritrea at night—which suggests that at least part of the route between Tripoli and Lake Tchad has been equipped. Nord-Africa Aviazione S.A. fly between Tripoli and Benghazi, on the coast of the Mediterranean, and Ala Littoria, at least until the present difficulties, flew twice weekly between Khartoum and Asmara, a service which was eventually to have linked Rome and Italian Somaliland.

On the north-west African coast Lineas Aereas Postales Espanolas run a service between Seville, Agadir, Cape Juby, and Las Palmas, a route which is followed by the D.L.H. Ju.52s on their way with the mail to the catapult ship lying off Bathurst. The Air France mail machines fly from Cape Juby, via Port Etienne, to Dakar and the Cape Verde Islands for the alternate packet boat and flying deliveries to Fernando de Noronha and South America.

A New Problem

LAST week, in the King's Bench Division, the widow of a passenger killed in the Ruyssedele accident was awarded £3,500 and her daughter £500 against Imperial Airways, Ltd. Mr. Justice Lewis held that the pilot of the Avro Ten Apollo which struck a wireless mast on December 30, 1933, was negligent. The pilot failed to obtain a wireless message and failed to pick up a landmark, but went on, knowing of this obstruction. A stay of fourteen days was granted pending consideration of the question of an appeal.

Commercial Aviation

Transoceanic Performance

IN *Flight* of January 24, 1935, the Martin flying boat was described and several of the more interesting figures were given. At that time, however, only approximate performance figures were available. These have recently been given as 179 m.p.h. and 157 m.p.h. for high and cruising speeds, with ranges for mail transport of 4,000 miles and for passenger-mail transport of 3,000 miles.

More interesting, perhaps, are the passenger and range figures given for service conditions. On the North-South American routes there will be daytime accommodation for forty-three passengers, cargo and a crew of seven, with a maximum range of 1,250 miles. For ocean service the maximum ranges required are 2,410 miles for the Pacific service and 1,824 miles for the Atlantic service. As a sleeper the Martin will carry eighteen passengers.

New Australian Service

THE Adelaide-Darwin service planned by Australian Transcontinental Airways was actually started at the beginning of this month with two Avro Tens—the late Mr. Ulm's *Faith in Australia* and the old *Southern Star* which was used between Brisbane, Sydney and Melbourne by New England Airways.

Unfortunately, the *Faith* developed engine trouble on the first trip back from Darwin and the machine was laid up at Daly Waters with a wrecked centre engine. The *Southern Star*, after one return trip, was returned to Mascot aerodrome to be reconditioned. The company has been temporarily running the service with a Percival Gull, carrying mail and two passengers, but the Avros should be ready and in service again by now.

The first Junkers Ju.52 is expected to be delivered in the middle of December. The people of Central Australia are certainly keen on the service and passengers were refused on all the earlier trips.

Change of Address

AS from Monday last, the address of the office and works of Aircraft Components, Ltd., is Arle Court, Cheltenham, and the telephone numbers Cheltenham 5141 and 5142.

"Hatfield 2345"

AS from Friday next, November 1, the telephone number of the De Havilland Aircraft Co., Ltd., will be changed from Hatfield 281 to Hatfield 2345 (14 lines). The Gipsy engine and variable-pitch airscrew works at Stag Lane will retain the old number, Edgware 0171.

NEW COMPANIES

MOTOR DRIVERS' PROTECTION ASSOCIATION LTD. Private company registered October 21. Capital, £250 in £1 shares. Objects: To safeguard, protect and promote in any manner the interests of motor drivers, motorists, motor cyclists, airmen, boat proprietors and yachtsmen, etc. Directors: Amos A. Denison, Cliftondale, York (director, Minster Finance Co. (York) Ltd.); Joseph G. Denison, 33, Queen Anne's Road, York (director, Minster Finance Co. (York) Ltd.); Geo. C. Seed, White House, Drighlington, nr. Leeds.

J. GRANVILLE GRENFEEL LTD. Private company, registered October 21. Capital, £100 in £1 shares. Objects: To acquire the business of J. Granville Grenfell, M.I.B.E., and to carry on the business of engineers and designers, to make engines for motor cars, aeroplanes, etc. Directors: John Granville Grenfell and Mrs. Minnie Grenfell, both of York House, West Byfleet, Surrey. Registered office: Brooklands Aerodrome, Byfleet, Surrey.

PUBLICATIONS RECEIVED

Aeronautical Research Committee Reports and Memoranda, No. 1651: *Comparative Measurements of Turbulence by Three Methods*, by the Staff of the Aerodynamics Department, National Physical Laboratory, price 1s. 3d. No. 1652: *Experiments*

Air Safety

THE safety of air travel, and of regular British air lines in particular, was emphasised by Mr. C. F. B. Richardson in a paper read before the Institute of Actuaries last Monday.

His statistics, which covered both internal and external flying by British companies, showed that twelve out of 28,327 passengers were killed in 1929, while in 1934 only nine out of the 135,000 persons carried were killed. In the six years the mortality rate for every thousand passenger flights was only 0.130. The author, however, emphasised the shortage of data and its lack of homogeneity.

Our Turn

DURING the past few weeks it has seemed as if all the care and all the pride in our "safety-first" fleet of commercial machines has availed us little. Just as K.L.M. passed through a period of misfortune earlier in the year, so have Imperial Airways had their meed of trouble. Fortunately, in this case, no lives have been lost.

First, the H.P.42 *Hanno* blew a tyre while in flight and was very seriously damaged while landing at Entebbe; then the Short *Syrinx* was caught in a sudden hurricane and blown over at Brussels. Last week a D.H. 86 *Draco* on the Budapest service, while returning from Vienna, was forced down with ice formation trouble in Lower Austria, the pilot having been at least partially lost in the extremely bad weather. The machine was more or less written-off. Finally, the Boulton Paul *Britomart*, which, with *Boadicea*, had been put on the Brussels service, was stalled into the ground at Haren and seriously damaged.

As if these troubles were not sufficient for us to bear, a Railway Air Service machine flew into a hillside last Saturday in conditions of poor visibility. Both the pilot and the single passenger were, in this case, tragically enough, killed.

It is significant that, of the five accidents, three were caused by adverse weather conditions. Air transport has a long way to go yet.

on Servo-Rudder Flutter, by W. J. Duncan, D. L. Ellis and A. G. Gadd, price 2s. No. 1654: *Spinning of a Bristol Fighter Model including Effect of Wing-tip Slots and Interceptors*, by H. R. Irving, A. S. Batson and J. H. Warsap, price 2s. No. 1655: *Statistical Measurements of Turbulence*, by H. C. H. Townend, price 9d. H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2.

The War in the Air. Vol. V. By H. A. Jones. Price 17s. 6d., or with map 30s. Oxford University Press, Amen House, Warwick Square, London, E.C.4.

A Story-Teller Tells the Truth: Reminiscences by Beria Ruck. Price 18s. Hutchinson and Co., 34, Paternoster Row, London, E.C.4.

Air Gold. By Colin Hope. Price 3s. 6d. John Hamilton, Ltd., 32, Bloomsbury Street, London, W.C.1.

Jagdstaffel 356. By M. E. Kähnert. Translated by Claud W. Sykes. Price 3s. 6d. John Hamilton, Ltd., 32, Bloomsbury Street, London, W.C.1.

Lubricity—October issue of house journal of Fletcher Miller, Ltd., Dukinfield.

AERONAUTICAL PATENT SPECIFICATIONS

(The numbers in brackets are those under which the Specifications will be printed and abridged, etc.)

Published October 24, 1935.

- 8778. ROBINSON, J.: Wireless-signalling systems for aircraft (435,621).
- 9402. JACOBY, H. E., AND NÜSSLI, H.: Starting apparatus for road vehicle and aeroplane engines (435,707).
- 9867. COATS, A. G., AND HAFNER, R.: Helicopter and rotating-wing aircraft (435,818).
- 11271. AVERY-HARDOLL, LTD., AND FRASER, J.: Apparatus for dispensing measured quantities of liquids, particularly for aircraft (435,628).
- 12056. SAUNDERS-ROE, LTD., KNOWLER, H., AND FARROW, J. R.: Lateral stabilising fins for flying boats (435,712).

Published October 31, 1935.

- 10549. RAMSBOTTOM, J. E., LOCKSPEISER, B., AND STEWART, C. J.: Aircraft and other vehicles and the like (436,099).
- 15241. ARMSTRONG SIDDELEY MOTORS, LTD., WYLIE, H. N., AND GAY, A. R. B.: Flexible mountings for aircraft power units (435,379).
- 13957. LONG, E. H.: Automatic variable-pitch propeller for aircraft and the like (435,919).



THE LATEST KLEMM: The clean "frontage" of the new German Klemm K1.35 (70-80 h.p. Hirth H.M. 60R. engine) is apparent in this view. The machine was described in *Flight* last week.